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The Story of Some Difficult Steel Castings

The Foundry, Machining, Testing and Transportation Problems of a Shaft Cover for New York's Catskill Aqueduct

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The Midvale Steel Works in Philadelphia recently made for the T. A. Gillespie Company, New York, some steel castings and forgings of more than ordinary interest, not only on account of the unusual size and shape of these pieces, but also on account of the use to which they are to be put.

In 1905 the New York Board of Water Supply started work on what is known as the Catskill aqueduct to obtain from the Esopus, Rondout, Schoharie and Catskill watersheds an additional supply of good drinking water for the city of New York in such quantities that the needs of that city would be taken care of for many years to come. The anticipated supply is expected to be at least 500,000,000 gal. per 24 hr. and the cost of the aqueduct and reservoirs, including parts of the system not yet undertaken, is estimated to be about \$175,000,000. The conduit is 134 miles long, including the portions in the city, with numerous tunnels and deep cuts. The aqueduct crosses under the Hudson River, wholly in granitic rock, at a depth of 1114 ft. below sea level, between a shaft at Storm King Mountain, on the west bank, and another shaft on the east side of the river at Breakneck Mountain. The top of the west shaft will be closed by a great Portland-cement concrete plug, but the east shaft, which is to be a drainage and access shaft for the Hudson siphon, required a removable cover, and for it the parts mentioned are to be used as the closure.

The drainage shaft is 14 ft. in diameter inside the concrete inner lining, which protects the 15-ft. diameter steel interlining, outside which concrete is solidly packed against the rock. About 10 ft. above sea level, this shaft is cov-

ered by a steel casting nearly hemispherical in shape. This dome rests on a cast-steel ring called the curb. To hold the dome in place against the service head of the water, which at this point will be about 410 ft., there are 36

anchor bolts, each $4\frac{1}{2}$ in. in diameter and 50 ft. long, made of nickel-chrome steel. These bolts go through bored holes in the flange of the dome and the curb and down through steel sleeves to an anchor ring about 46 ft. farther down. The object of these sectional steel sleeves is, primarily, to insure the application of the anchorage stresses at a suitable depth in the rock and, secondarily, to permit the removal of the bolts if desired in connection with the removal of the cover for inspection and also to protect the bolts from rusting by seepage water. The top and bottom sections are steel castings with about 50 collars on the outside to afford a good grip on the concrete; the middle sections are galvanized pipes. These sleeves are later to be filled with mineral oil or some similar substance, as a further protection for the bolts. Fig. 1 will probably give a better idea of the arrangement than any description.

Preliminary work for the Hudson pressure tunnel, or inverted siphon, was done by the Board of Water Supply, but the contract for its completion and connection with adjacent tunnels of the Catskill aqueduct at each end was

awarded to the T. A. Gillespie Company. The molding, casting, forging, machining and transporting of the dome, curb, anchor ring and bolts afforded many perplexing problems and a glance at the sizes given on the sketch will explain the reasons, and why it took 13 months of unremitting labor before the work was completed and tested.

The cover, or dome, naturally took the longest time to make. It had been decided that no pattern would be

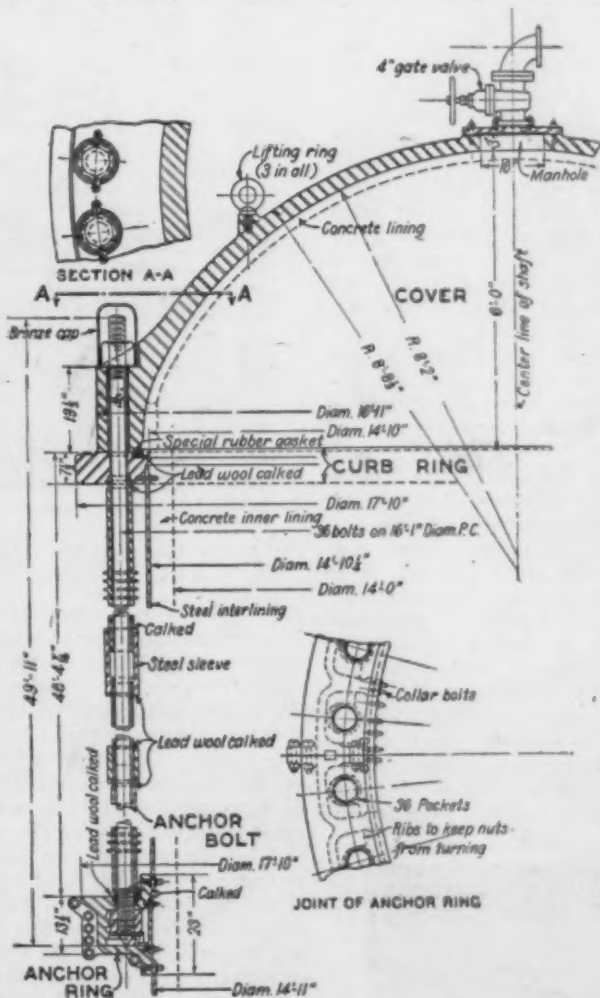


Fig. 1—General Scheme of the Watertight Cover to a Shaft of the Catskill Aqueduct of New York's Water Supply

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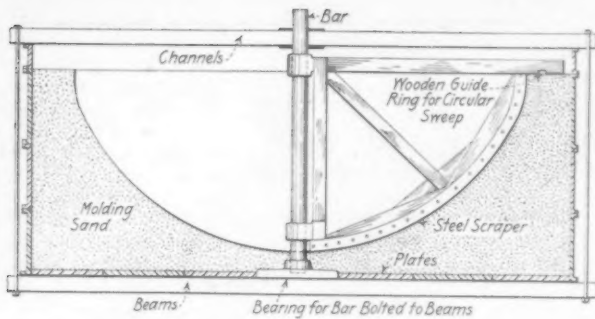


Fig. 2—The Sweep for Inside of the Cover Dome

used for this, but that the shape would be swept out. To this end a large flask about 20 ft. square was built up of solid steel frames or plates in such a way that the structure would be rigid while pouring the casting, and allow the loosening of the bolts holding the frames together so that the casting during cooling could freely contract and shrink without danger of cracking. That the contraction of a casting of this size is considerable will be seen when it is remembered that steel shrinks in cooling about $3/16$ in. per foot, or, in this case, about $3 \frac{3}{16}$ in. in diameter and about $1 \frac{1}{4}$ in. in height.

On the floor of the steel foundry large I-beams were closely spaced and covered by steel plates. In the center was located a bearing for the bottom end of the spindle of the sweep. This spindle was supported on top by a steel channel across the flask. The dome was to be cast with the concave side up on account of the heavy flange. The cope was first made in the following way: A wooden sweep was cut to the inside contour of the dome and strongly mounted on the steel spindle, supported as already noted. The flask was then filled with old molding sand to somewhat near the shape of the sweep, and then this was lined with new molding sand, well rammed and then swept to the exact size by rotating the sweep, the arm of the sweep being guided by a wooden ring on top of the drag, working in a corresponding groove in the arm; see Fig. 2. The surface was then smoothed over and painted with a thin cement wash and covered with newspapers, as the shape in which it now appeared was to serve as a mold for the cope, and the papers were expected to prevent any adhesion between the surfaces. Also the cement formed a very hard surface, after being allowed to set in the air for several days.

The sweep was removed, but the spindle was left in place, supported as before; facing sand to a thickness of about 5 to 6 in. was then carefully rammed all over the bottom and well up on the side, after which a cast-iron crab was mounted on the spindle and, supported on a piece of pipe, slipped over the spindle. The rim was wound with straw rope, which would burn out when the heat from the casting struck it, and allow the sand to yield against the pressure of the contracting casting. Numerous hooks were suspended from all available places to support the sand. The center part was filled with old sand and cinders to form a porous cushion. On the crab was mounted another pipe separator around the spindle and several $1 \frac{1}{2}$ -in. bolts were let through the rim leading up to the next crab above (not yet in place). Then facing

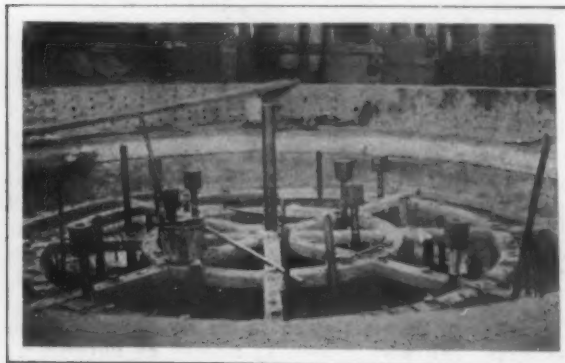


Fig. 3—Cope in Process of Making. The Top Crab or Spider May Be Seen with Bolts and Gas Pipes in Place, but the Straw Has Not Yet Been Wound Around the Rim of the Crab

sand and a cinder center core was built up, as before, until the position of the second crab had been reached, when it was put in place and securely bolted down. And so on up to a third crab held fast to the second crab by a dozen or more $1 \frac{1}{2}$ -in. bolts, all with pipe separators. The second and third crab were like the first one, only larger in diameter, and all had the rims wound with straw. The teeth on these crabs came within about 6 in. of the surface of the cope. About two dozen old pieces of gas pipe were built in as the work progressed, to carry the gases away. Fig. 3 shows the cope completely up to the third crab.

When finally the top of the flask had been reached, the top of the drag was carefully smoothed up and cement wash, parting sand and newspapers spread on the top surface, and the work of building up the cope proceeded, the bolts from the crabs being carried up between four

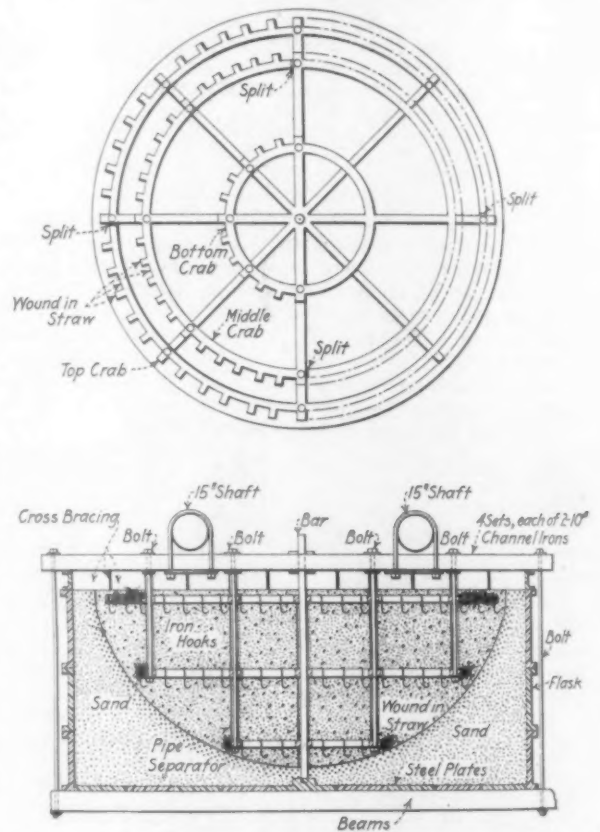


Fig. 4—The Cope Complete Prior to Removal from the Drag in Which It Was Formed

sets, each of two channels spanning the flask and all nuts screwed tight, and so holding the whole mass solidly together, being helped by the cross work of steel bracings in the flask and the innumerable hooks suspended from them. A cross-section of the mold at this stage looked about as shown in Fig. 4. On top of this was laid two 15-in. shafts that happened to be on hand, each about 25 ft. long and securely bolted to the framework by U-bolts and clamps, these serving as attachment for the crane slings, after which the whole was carefully lifted up.

That the greatest care had been exercised in molding was shown when the mold was parted, as the parting was almost perfect, not over three hours' work being necessary to repair the spawling of the facing, nor was there any measurable sag in the core, which was of the utmost importance, as this would have encroached on the thickness of the casting. The cope was left resting on steel blocking, that had previously been prepared and carefully leveled up, alongside of the mold, and after smoothing the surface, it was studded with nails, to prevent washing away of the surface in casting. It may here be of interest to note that about 11 carloads of sand were used in the mold and about 20 kegs of nails for studding the cope, and as many more for studding the drag, and that the cope had about 20,000 lb. of metal in it and weighed complete about 240,000 lb.

The mold that had served as a former for the cope was next dug out to a further depth agreeing with the

thickness of the casting and a strip was bolted on to the edge of the sweep, so that it now represented the outside contour of the dome, resting at bottom and top on the same surfaces as before and guided at the arm by the guide ring, without which it had been found that there was considerable sag in the sweep. Things now looked as in Fig. 5. The mold was swept out as before, smoothed, holes for runners were cut and surface nailed up, as with the cope. Four lugs were located at the flange as at C, Fig. 6. These lugs were given such a slope on the under side that in shrinking vertically, as well as diametrically, there would be no danger of the casting being left hanging on these lugs and probably crack. The runners were located as shown, one at B near edge of flange and one at A near the bottom of casting.

The cope had in the meantime been completed and had been surrounded with sheet iron, and a slow coal fire built in crates so as to give an even, uniform temperature. Similarly a fire was built in an iron basket in the drag, and all covered over with sheet iron. After thoroughly drying for several days, the parts of the mold were put together after first locating several clay balls at different points of the surface. The cope was then lifted up again and the thickness of the clay balls now measured. This gave the thickness of the steel castings at these points and showed that no deformation or sag had taken place in the mold. The cope and drag were matched by scratch marks and dowels on the frame locating the proper position and then everything was made secure by clamps and straps and bolts from the bottom I-beam up to the top channels. It took four months to make this mold.

The casting was poured through runners A and B from two ladles. The capacity of the ladle was 124,000 lb., which filled the mold, but did not entirely fill the risers, so another ladle was brought on and poured 14,000 lb. more into the risers until filled. Everything was then loosened up, to allow free contraction of the casting. It may be noted that the finished casting weighed 92,500 lb., the difference between this weight and the cast weight being mainly the twelve 15-in. diameter by 48-in. risers that rose vertically from the top to the rim, spaced about equally around. No holes were cored in the casting, except the central hole 16 in. in diameter in the crown of the dome. After having been left in the mold for 12 days, the casting still retained a very considerable heat, but was then cleaned on the inside, the outside clearing itself, when it was lifted out and put in a special anneal-

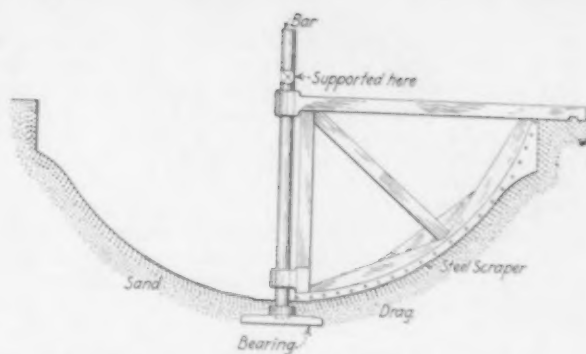


Fig. 5—Sweep for the Outside of the Cover Dome

ing furnace that had been built alongside. After a thorough annealing, the casting was taken out and tested from runners, from coupons on the rim and later from core drillings in four of the anchor bolt holes. The results obtained averaged as follows:

	Tensile strength	Elastic limit	Elongation, per cent.	Contraction, per cent.
From runners.....	65,500	34,000	30	56
From coupons.....	68,000	36,250	30.6	57.2
From core drilling in bolt holes	66,000	35,000	28.5	42.8

Bends gave about 170 deg. before showing fracture.

Compared with the dome, the molding of the curb ring afforded no particular difficulties either in molding or casting, excepting that its larger diameter made it subject to a shrinkage even greater than that of the cover, but as there was no depth to it, as in the case of the latter, there was no serious pressure and it was easier to provide for the liberation of the mold, so as to leave the ring to contract freely. Part of the flask used for the cover was also used in this case, and after leveling the floor of the molding shop, a quantity of molding sand was spread around roughly corresponding to the size of the ring. Around and inside of this, old sand from the floor was thrown and leveled up. Then the shape of the ring was swept in a manner exactly similar to the dome, after which the central space was filled with cinders. The cope was made from the same frame that was used in the dome and was made in the usual way for this kind of casting, only being unusually large. Eight 15-in. risers 30 in. high were left on the top surface and secured a casting that was absolutely free from any blow holes.

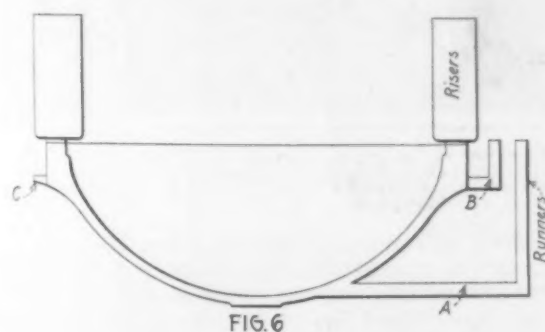


FIG. 6

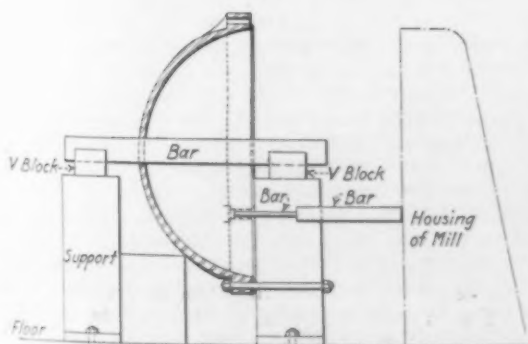


FIG. 8

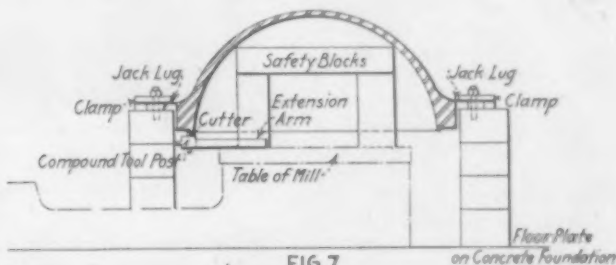


FIG. 7

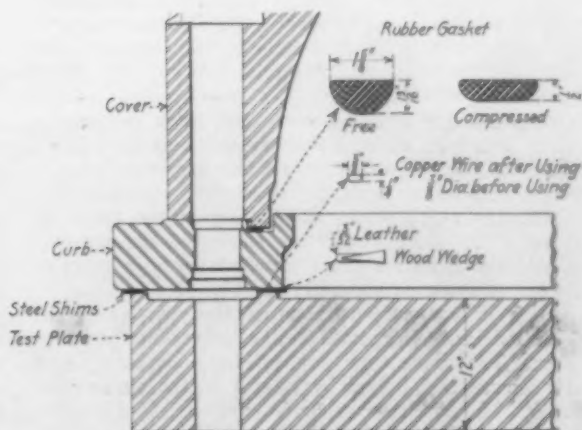


FIG. 9

This Group of Sketches Shows the Casting Complete with Runners and Risers, in Fig. 7, the Method of Supporting the Cover While Facing on a Vertical Boring Machine, and in Fig. 8, the Finish Boring of the Anchor Bolt Holes on a Horizontal Boring Machine.

Fig. 9 Shows the Preparations Necessary for the Hydraulic Test

whatsoever; in fact, not a single flaw appeared in this casting after having been machined. No bolt holes were cored in the casting. The ring was annealed in the same furnace as the dome and at the same time.

The anchor ring was cast in four sections, to be bolted and keyed together. As all four sections were practically alike, they were cast from one quarter-section pattern. Three of the sections were planed on the ends forming the joints, then laid together forming part of a ring on a surface plate; two circles were scratched on their top face and the chord lengths measured for the fourth piece; these measurements were transferred to the fourth piece, which was then planed on the ends to these lengths. All bolt holes were drilled and keyways planed in both end faces, on two opposite sections, after which all four sections were assembled on the surface plate and the holes and keyways were scratched to match on the two sections not yet drilled. In this way a good job was secured in all cases and the pieces fitted neatly together in assembly. The assembled ring was machined on the same mill and in the same way as the curb ring. The bores and counter bores for the anchor bolts and sleeves were bored and reamed in a horizontal boring and milling machine, each section, of course, being disconnected from the others while so doing.

Each of the 36 pockets, shown in Fig. 1, into which slip the bottom nuts for the anchor bolts, had its opening closed by a curved steel plate, held in place by fourteen $\frac{3}{4}$ -in. collar bolts, the holes for which were drilled by an air drill and tapped by hand. For the purpose of hydraulically testing the watertightness of the casting, the steel plates were removed and substituted by a cast-iron ribbed, test plate spanning three pockets, and machined to fit the inside curvature of the ring. The joint between the plate and the ring was made with a thin rubber gasket. The test, calling for a pressure of 200 lb. per sq. in. to be held for one hour, was satisfactorily passed.

The shape of the cover-dome made it difficult to hold on the machines, but fortunately there were four lugs $8 \times 6\frac{1}{2}$ in. sticking out on the rim of the casting, as already mentioned, and these afforded anchorages for clamps and stops. The first machine operation was to remove the 12 risers on the rim. This was done by drilling a line of holes through the risers near their bases. It had been deemed inadvisable to burn the risers off, on account of the strains that might be set up. Next, the dome was put on a large pit planer and a rough cut taken over the bottom face until within $\frac{1}{4}$ in. of finished size, so as to remove the stumps of the risers and to get a straight surface from which to lay out the work, and also to minimize the work for the mill on which the finish facing was to be done. This mill was a 12-ft. vertical mill, on which the housings were run back out of the way. An arm with about 3 ft. overhang was then bolted to the top of the mill table and on this arm was bolted a compound tool slide, with travel enough vertically and horizontally to reach across the bottom of the flange of the dome. The dome itself was supported on cast-iron distance blocks from a surface plate, placed on a concrete foundation in front of the mill; see Fig. 7.

In back it was supported on similar smaller blocks across the shears of the mill frame, where the housings had been. The dome was then carefully leveled up and securely braced and bolted by clamps to the above-mentioned lugs. As any movement of the casting, in a rotative direction, would have shifted these narrow lugs from their supports, and let the casting drop down on the machine, a matter of about 5-ft. drop, a pile of cast-iron blocks was built up from the mill table to within a few inches of

the inside top of the cover, so that that height would be the extent of the fall in case anything happened. Besides, this also gave an additional weight to the mill table, and steadied it under an uneven cut, when undue vibration might be set up in the machine.

Under these conditions, the machine table did not carry the weight of the job, which would have been objectionable both on account of the weight, which at that time was well over 100,000 lb., and also on account of the difficulty of properly supporting the job on a 12-ft. table and leave the face clear to work on. Even with the precautions taken, the vibrations periodically so increased that it was found necessary to use two wooden brake blocks, pressed against the circumference of the table, which effectually controlled this difficulty.

The dome was next taken to a radial drilling machine in another shop for preliminary drilling of the thirty-six $\frac{5}{8}$ -in. bolt holes. These holes were drilled to $\frac{1}{2}$ -in. diameter by special inserted blade bits. Owing to the depth of these holes, about 21 in., there was considerable difficulty with the chips choking the cutters, so that over four weeks were consumed in this operation alone. The counterboring was done in the same machine, with a cross cutter guided in the bores by a bushing. The dome was then again transferred to the first shop for the finish boring of the holes. This operation was done on a



Fig. 10—To Test the Assembled Castings at the Works, a Special Test Plate 17 Ft. in Diameter Had to Be Built and Also Relatively Short Bolts to Take the Place of the Anchor Bolts Which Were too Long. Bronze Caps Protect the Top of the Anchor Bolts from Moisture

horizontal milling and drilling machine. The dome was supported on a 15-in. mandrel, resting in V blocks, supported on cast-iron distance blocks as shown in Fig. 8. In this way most of the weight was carried, but to keep the face vertical it was of course necessary to further support the casting by blocking and bolting. About five holes could be drilled before it was necessary to rotate the casting for another setting. Two cuts were taken in each hole with cross cutters, the last being a reaming cut. Also the counterbores were trued up to give a good seat for the nuts. In all it took 14 weeks to machine the dome.

The curb ring went through the same series of operations, except that instead of having the job stationary on the mill, it was, in this case, supported on radiating arms bolted to the mill table, and the housings run back far enough to clear. The cutting was done by the cutters on the tool bar from the cross rail of the machine in the usual way. The finish reaming of the bolt holes was done in a radial drilling machine. When each casting was in the mill for facing, a pitch circle had been scratched in, giving the center lines of the bolt holes. These were then spaced off and proved in the assembly to vary very little from matching corresponding holes in the other casting, and as there was plenty of clearance around the bolts, this little inaccuracy did not matter. In fact, two 3-in. dowel

holes were laid out this way, diametrically opposite, and when the dowels were put in and the two castings placed on top of each other, they fitted so neatly that no filing or shifting was necessary.

The repeated transferring of the castings from one shop to another was not altogether due to a desire to see them move; but owing to a pressure of other work it was necessary to make use of any suitable machine that might be available at that particular time, in preference to chancing a prolonged wait in the shop where the casting happened to be. In these shiftings in the works, the castings were loaded horizontally across the railroad car on top of roller bearings made of two sets of channels with short pieces of steel bars between. This arrangement was made necessary by the fact that in several places electric light poles and crane columns interfered and necessitated shifting of the casting to let it pass; the shifting was done by blocks and tackle on both sides, which also kept the castings in place on the car.

The contract called for the castings to sustain a hydraulic pressure of 250 lb. per square inch for 24 hr. In order to do this, it was necessary to make a bottom for the dome. This test plate was made perfectly flat and was 12 in. thick, 17 ft. in diameter and had thirty-six 6-in. cored holes around the rim for the test bolts holding the dome, curb and test plate together. On the top face were

successful, so it was changed for a soft leather gasket, also bent U shape and held open by several hundred small wooden wedges, so that the water would not enter the back of the gasket and close it up. This is shown in Fig. 9.

In this way the test pressure of 250 lb. per square inch was successfully held for 24 hr., although there was some leakage in spots, where, by mistake, some of the wedges had been put between the gasket and the casting, instead of into the fold of the leather. Fig. 10 shows the castings under test, and also shows the bronze caps that protect the top of the anchor bolts from moisture. The bolts used in the test were especially made for this purpose, as the anchor bolts of course were unsuitable on account of their length; but the nuts were the regular anchor bolt nuts. The manhole on top of the cover was made tight by a thin lead washer and showed no leakage whatever.

The deflection of the castings was as follows: The test plate bulged down in the centre 0.12 in. and bent up at the edges 0.125 in., a total of $\frac{1}{4}$ in. The dome at the top raised up 0.15 in., from which should be subtracted the rise at the edge, 0.125 in., leaving about 0.03 in. net vertical tightening of the dome. The radial reflection of the dome was not made in a satisfactory way, as only 3 points were taken, but there were indications of a slight radial contraction, as might be expected.

It had originally been the intention to ship the castings by team to the Delaware River, and from there on barges by water up to Storm King on the Hudson, by way of the Raritan canal, as the railroads had claimed inability to ship them. But later careful measuring showed that by stowing the castings on special cars without bottom, and allowing only about 4 in. clearance over the rails, Fig. 11, it would be possible to ship them by the Pennsylvania Railroad by going a roundabout way to avoid bridges. As it was, it was necessary to lower the tracks about 20 in. under a bridge just outside the Midvale Steel Works and at another place there was found a bridge where the castings in passing under took off a few bolts. The shipment was made on a Sunday by special locomotive, and it took 14 hr. to get to Jersey City, as at times the cars, being top-heavy, would start oscillating so that the train had to be stopped until they had quieted down again.

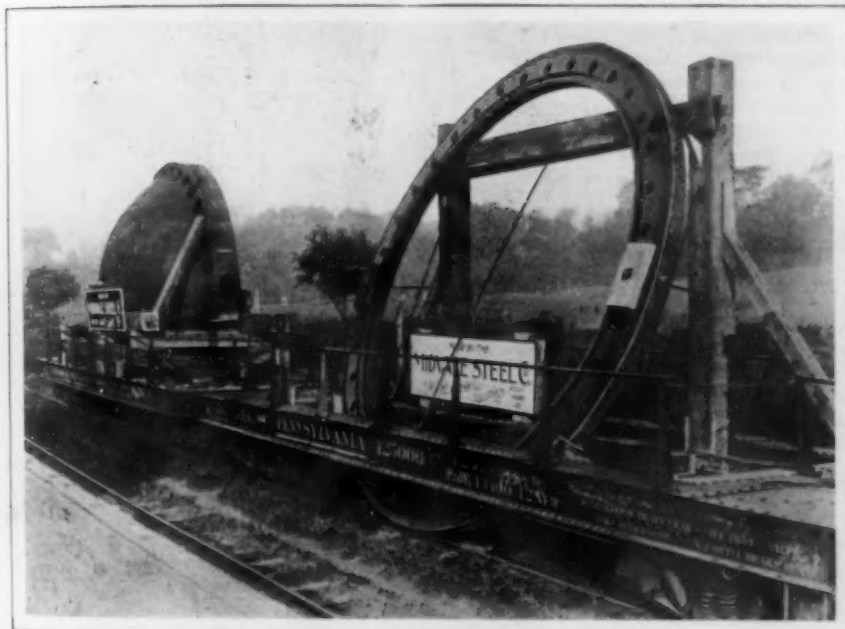


Fig. 11—Shipment on the Railroad had to be Made on a Sunday and it Took 14 Hr. to Get from Philadelphia to Jersey City, the Oscillations Becoming so Great at Times that the Train had to be Stopped Until They Quieted Down. There was a Clearance of Only 4 in. Over the Rails

two circular ledges, about $1\frac{1}{2}$ in. wide x $\frac{3}{4}$ in. high, and the top face of these ledges was the only part to be machined on this casting, except spot facing around the bolt holes on the bottom face. This casting weighed 114,000 lb. without risers and 158,000 lb. as cast with eight 18-in. risers.

To secure tight joints during the hydraulic testing of the castings, a soft rubber gasket, semi-circular in section with a $\frac{13}{16}$ -in. radius, was placed in the tongue and groove between the curb and cover. Although this rubber gasket was only compressed $\frac{3}{16}$ in. when the castings were metal to metal, it sustained the total weight of the cover and bolts, about 102,000 lb., without even compressing this $\frac{3}{16}$ in., and it was only after some tightening up on the bolts that the joint was entirely closed; this gasket gave good service. The joint between the curb and test plate was made by a $\frac{3}{4}$ -in. diameter soft copper wire. Although this wire was pressed between machined faces on the castings, and was compressed by tightening on the bolts to $\frac{1}{4}$ -in. thickness, it still failed to hold against a pressure of more than 170 lb. per square inch without very excessive leaking, most likely due to the dishing of the bottom test plate, together with a little stretching of the bolts. The addition of a soft rubber gasket bent U shape on the inside of the copper wire was not more

The thirty-six nickel-chrome steel anchor bolts, $\frac{4}{8}$ in. diameter and 50 ft. long, with a nut on each end with Whitworth threads, deserve a few words. These bolts were smooth forged in one piece, under a press, and had proper enlargements on each end for finishing where threaded and also a suitable excess in length, as each bolt had test bars taken from both ends. After forging, the bolts were suspended in a vertical heating furnace, capable of taking lengths up to 70 ft. After being given a thorough and uniform heating, the bolts as suspended were lifted out of the furnace and lowered into a vertical subterranean double tank, 90 ft. deep, with the tempering fluid in the inner tank and the cooling water in the annular space between the tanks. After some few moments of submerging in these tanks, the bolts were lifted up again and suspended in the same furnace for the purpose of drawing the temper. By keeping the bolts continually vertical, especially while heated, they were kept fairly straight, but even then it was necessary to further straighten each bolt in a hydraulic straightening machine, as the sleeves in which the bolts were to be used only allowed about $\frac{1}{4}$ in. out of line.

The specifications called for a tensile strength of 100,000 lb. per square inch; elastic limit of 80,000 lb. per square inch; elongation of 20 per cent., and a contraction

of area of 45 per cent. Owing to the great length and slenderness of these bolts, it was difficult to get identical results from both ends, as the upper end would have cooled somewhat before it had been lowered into the tempering fluid and also the lower end would naturally remain the longest in the bath, being the first to enter and the last to leave it, but these difficulties were finally overcome and good results were obtained. The physical characteristics of the bolts are as given in the accompanying table. The elastic limit given is not the yield point obtained by drop of the beam, but is the true elastic limit taken by extensometer.

Physical Properties of the Nickel-Chrome Steel Anchor Bolts				
	Tensile strength, lbs. per sq. in.	Elastic limit, lbs. per sq. in.	Elongation, per cent.	Reduction of Area, per cent.
Typical, one end.....	114,500	82,000	22.5	62.6
Typical, other end.....	116,500	83,000	22.5	62.3
Highest results, one end.....	125,000	102,000	21.2	62.6
Highest results, other end.....	130,000	113,000	21.1	61.1
Average of all, one end.....	118,500	91,200	21.3	62.5
Average of all, other end.....	119,300	89,200	21.1	61.7
Average of 9 test bars from one bar.....	120,500	93,300	20.5	61.6
Average of 3 test bars from both ends.....	121,000	91,700	21.1	60.7
Average of 3 test bars from the middle.....	121,500	91,700	20.6	62.6
Test of bars at Phoenixville...	107,000	86,000	*	69
Test of bar at Washington....	113,900	81,900	†	56

*1.02 ft. in 20 ft. †3.44 in. in 20 in.

To test the actual strength of the anchor bolts, it was decided by the New York Board of Water Supply that one of the bolts should be broken, full size. It was, however, found that no testing machine in this country was both long enough and strong enough to do so. Only two machines had the requisite strength, namely, the testing machine at Phoenix Iron Works, Phoenixville, Pa., which has a capacity of 2,800,000 lb. and can break eyebars up to 50 ft. long, but owing to special rigging needed, can only break bolts, as this one, up to about 40 ft. long; the other machine is the one at the Bureau of Standards, Washington, D. C., having a capacity of 1,115,000 lb. for tension and 2,300,000 lb. for compression, and can only break up to about 34 ft. lengths. In consequence, the bolt was cut in two, one piece was upset near the ends to 5½ in. diameter for threading; both pieces were annealed and then clamped together, so as to hang in continuation of each other, as if it had been one bolt of the original length of 50 ft., and in this position was subjected to the same treatment as the other bolts, and under exactly the same conditions. Nine test bars were taken from the two pieces, three from each of the extreme ends and three from the part that had been the middle of the original bolt. The averages of these tests are given in the table mentioned. The upset bolt was threaded at the upsets to 5 in. diameter for nuts, but was otherwise left rough; this bolt, about 20 ft. between nuts, was broken at the Phoenixville Iron Works. It took 1,716,000 lb. to break it and gave the results also included in the table.

The other piece was threaded at the ends to 4½ in. diameter and at the middle for a distance of 2 ft. was turned down to exactly 3½ in. diameter; this bolt, about 17 ft. between nuts, was broken in Washington at the Bureau of Standards. It broke under a load of 1,096,000 lb. and showed results given in the table.

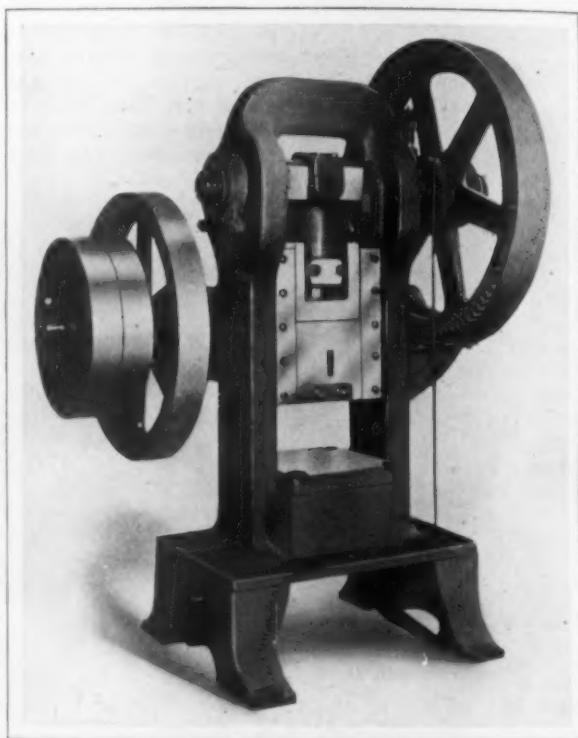
These statements record the successful accomplishment of an undertaking in steel manufacture that could have been handled only in one or two other places in this country and from them shipping would have been practically impossible. While the Midvale Steel Works has produced steel castings of two and three times the weights recorded, yet it is doubtful if more difficult castings and forgings have ever been made, calling for such engineering and mechanical skill and nicety of technical knowledge; and these pieces will form an interesting detail of a wonderful and not wholly appreciated undertaking—the Catskill Aqueduct.

A license has been granted by Sherard Cowper-Coles to the British Mannesmann Tube Company for "ferrozincing and ironizing" boiler tubes to prevent corrosion, according to the London Times. The process consists in coating the tubes with a thin layer of pure iron, which may or may not be afterwards coated with zinc. The coating of pure iron is found to be very inert to chemical action, and thus forms a good protective coating.

Geared Power Press for Light and Heavy Work

A line of eleven sizes of straight-sided single-crank presses has been recently brought out by the Cleveland Machine & Mfg. Company, Cleveland, Ohio. They are designed for blanking, forming and drawing light and heavy sheet metal parts, and the capacities range from 45 to 1100 tons. The stroke of the slide and die space can be varied to suit the work in hand, and when fitted with long strokes the larger sizes in particular are equipped with friction clutches to facilitate the setting of the dies and provide a means of stopping the machine at any part of the stroke. The small and medium sized presses are largely used as trimming presses for drop forged parts and when so used are frequently equipped with an outer cut-off slide for cutting the forging from the bar.

The brake band is hinged and clamped under heavy spring pressure, which automatically compensates for wear



A New Straight-Sided Single-Crank Geared Power Press for Blanking, Forming and Drawing Both Light and Heavy Work

of the brake lining and for expansion and contraction due to the heat produced by the friction of the brake. The clutch is of the sliding block type, with three engaging points faced with hardened tool steel blocks.

The following table gives the principal dimensions and specifications of the press illustrated, which is designated by the builder as the No. 54:

Distance between housings, in.....	24½
Size of bed and bolster plate, in.....	24 x 24
Opening in bed, in.....	14 x 14
Distance between bed and slide, stroke and adjustment up, in.....	16
Stroke of slide, in.....	4
Adjustment of slide, in.....	3
Thickness of bolster plate, in.....	3
Diameter of shaft, in.....	6
Pressure exerted, tons.....	175
Approximate net weight, lb.....	17,000

If desired, all the different sizes of presses can be fitted with a drawing attachment and also with a bar knock-out in the slide.

President J. F. Welborn, of the Colorado Fuel & Iron Company, states that reports on the Colorado coal strike situation are incorrect. The strike order was responded to by not over 5000 mine workmen, approximately 40 per cent. of those employed in the State. The State's production is now running between 50 and 60 per cent. of normal, and mines are making daily gains. The Colorado Fuel & Iron Company's steel plants at Pueblo are operating with no signs of shutting down.



A Foundry Notable for Transporting Devices

An Unusual Adaptation of the Monorail and Trolley Crane in the New South Works of Case Threshing Machine Company

In the pursuit of maximum production economies, plant designs have tended to depart from general types in favor of special arrangements the peculiar features of which are especially adapted to the requirements of a dominant scheme of operations. The continuous foundries of various types are examples of this. In some plants the industrial track idea dominates the layout and equipment, and in others, conveyor systems or overhead crane service. This specialization patently has for its purpose maximum efficiency in the handling of material through the processes of manufacture. Transportation of materials thus is conceded to be a factor of paramount importance. The gray-iron foundry which the J. I. Case Threshing Machine Company is constructing as a part of its new South works at Racine, Wis., though incomplete is a timely and interesting example of a plant literally built around a specialized intra-plant transportation system.

This South works plant will produce the cast-iron parts for Case gas tractors and Case motor cars. The plant now approaching completion consists of a foundry, 174 ft. wide and 755 ft. long; a machine shop, 160 ft. wide and 750 ft. long; a 4-story building for the storage of materials held in stock, including raw materials, semi-finished castings in transit from foundry to machine shop and finished parts, and an electric power house and pumping station. A birds-eye view with the foundry in the foreground and the machine shop in the background is here shown. In general the buildings are of heavy steel construction, carried on concrete foundations. The walls are of brick and the lighting sash, the Detroit Fenestra type. The roof design of the foundry is a typical saw tooth, affording a north light, provided with two ventilators on each ridge and a ventilating trap door at both ends of each roof segment. A saw-tooth design is also the essential characteristic of the machine-shop roof, although so much importance has been given to securing the north light as to result in somewhat unusual arrangement.

On the east side the foundry building is flanked by a raw materials storage yard of equal length with the foundry and 80 ft. wide, spanned by a 10-ton Shaw crane equipped with lifting magnet. On the opposite side of the foundry the 80 ft. of space intervening between it and the stock building is to serve as a storage yard for castings and raw material for the tractors, and is likewise traversed by a Shaw crane, this of 20 tons capacity. Serving all parts of the foundry floor and connecting the foundry with both of the storage yards and also with the stock building, is a Shaw improved electric monorail system. This monorail system coupled with an elaborate installation of overhead hand and electric hoist cranes operating at right angles to the line of the monorail constitutes a distinctive feature of the plant. The general layout of the foundry and of the monorail and crane systems is shown in the accompanying drawings.

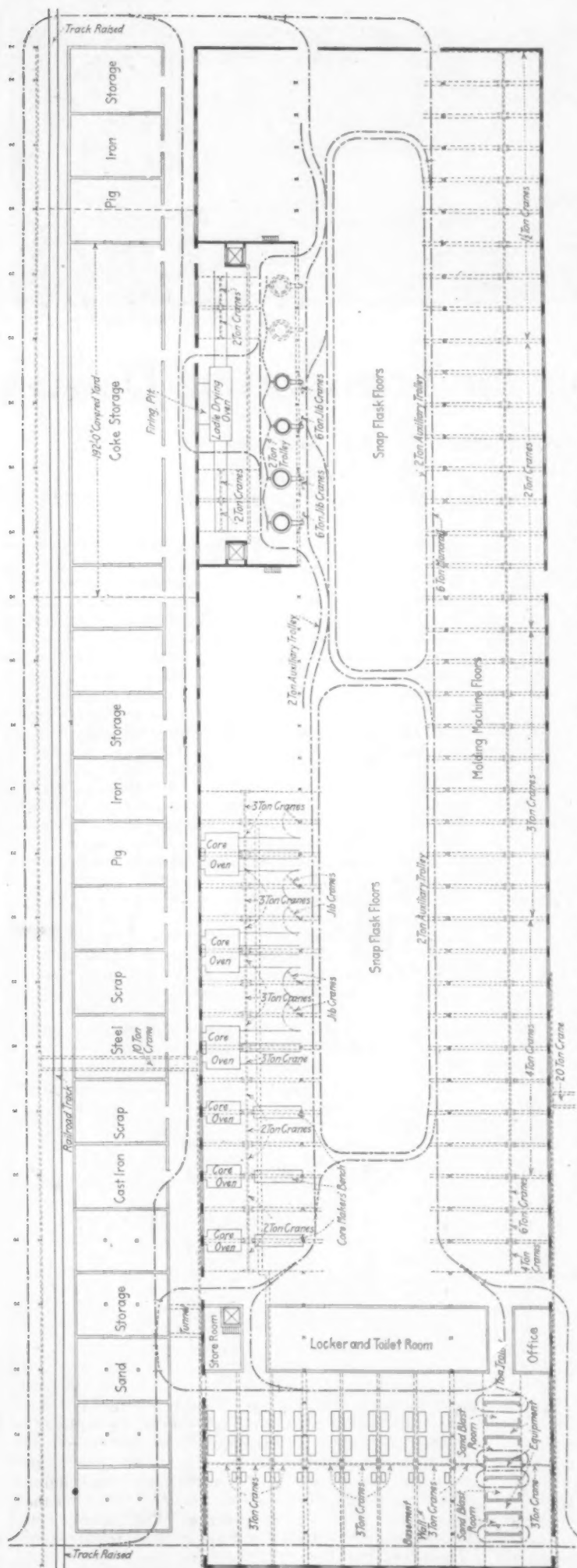
In the raw materials storage yard the provisions made for storing and handling the coke, stone, scrap and pig

iron are apparent from the layout. For the storage of sand, concrete bins have been built, the floor of the bins being 10 ft. below the floor of the foundry and at a level with a sub floor space under a portion of the core making floor. With this basement the sand bins are connected by tunnel. An elevator of the hydraulic type built by A. Kieckhefer, Milwaukee, is installed for raising the sand to the main floor. The sand bins are enclosed with a frame structure arranged with hatches in the roof and with apertures on the side so that the sand may be unloaded into the bins either by dropping from the crane or directly from box cars brought in on the track which traverses the storage yard and parallels the sand building.

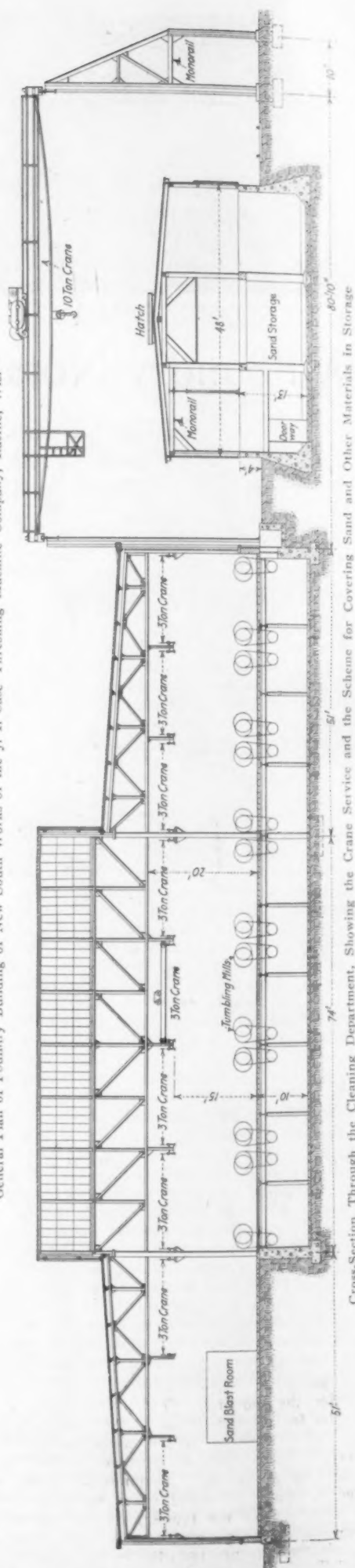
The provisions for handling raw materials from the yard to the cupolas include an extension of the charging floor at a height of 25 ft. above the yard level and extending out under the crane about 17 ft. This platform is 160 ft. long and is divided into ten platform compartments, separated by 2-ft. partitions. The entire structure is of steel. The iron melting plant of the foundry occupies a space centrally located in the east bay, 160 ft. long. Provision is here made for the installation of six cupolas, of which for the present two new 102-in. cupolas lined to 84 in. inside will be installed with a capacity of about 25 tons per hour and two 84 in. cupolas, from the old foundry, lined to 66 in. inside and with an average capacity of 20 tons per hour. There will thus be available a melting capacity approximating 1000 tons per day. The cupolas and charging equipment were built by the Whiting Foundry & Equipment Company, Harvey, Ill. The cupolas are spaced 22 and 26 ft. center to center. The blowers are mounted on a mezzanine floor at a height of 14 ft. above the main foundry floor and consist of a No. 7½ Roots blower driven by a 75 hp. motor for the two new cupolas with a somewhat smaller blower of the same type for the old cupolas.

The charging floor is at a height of 25 ft. above the yard level and is reached by two 8 x 8 ft. elevators of 7½ tons capacity, one at each end. These elevators are used only in emergency, the materials being handled ordinarily from the extension platform in small cars. Two parallel transfer tracks traverse the charging floor from one end to the other. Crossing the floor and intercepted by the transfer tracks are narrow gauge tracks made of ¾ x 2½-in. flat bars with a gauge of 2 ft. upon which the charging trucks move across from the extension platform to the cupola. On the one transfer track, the transfer car is equipped with scales for weighing, while the other transfer car gives added flexibility in mixing the materials for the row of cupolas. The cupolas are equipped with charging machines so that the material is charged without handling directly from the cars. An accompanying drawing gives an idea of the overhead trolley system by means of which the ladles are carried around behind the cupolas to a ladle drying oven.

On the same side of the foundry the remainder of the



General Plan of Foundry Building of New South Works of the J. I. Case Threshing Machine Company, Racine, Wis.



Cross-Section Through the Cleaning Department, Showing the Crane Service and the Scheme for Covering Sand and Other Materials in Storage

side bay will be used for the making of cores. Here the core ovens are also installed including three shelf ovens and three car ovens. These core ovens are of special design and are fired from the sub-floor space below, which was previously mentioned in connection with the sand bins. The smaller core ovens are equipped with rotating cast-iron core tables on a vertical shaft, the tables being carried on ball bearings. The fire pit is below.

The core makers benches will be placed crosswise of the bay in front of the core ovens and along the line of the columns, the sand being brought to the benches by means of the monorail system. This entire floor is of concrete. For handling the cores from the benches and in and out of the ovens, steel trays have been provided of a design so that they can be nested while filled with cores. For the carrying of these trays the entire floor area is covered by small cranes. These cranes mounted on parallel runways are hand operated from the floor and carry trolleys of 2 and 3 tons capacity.

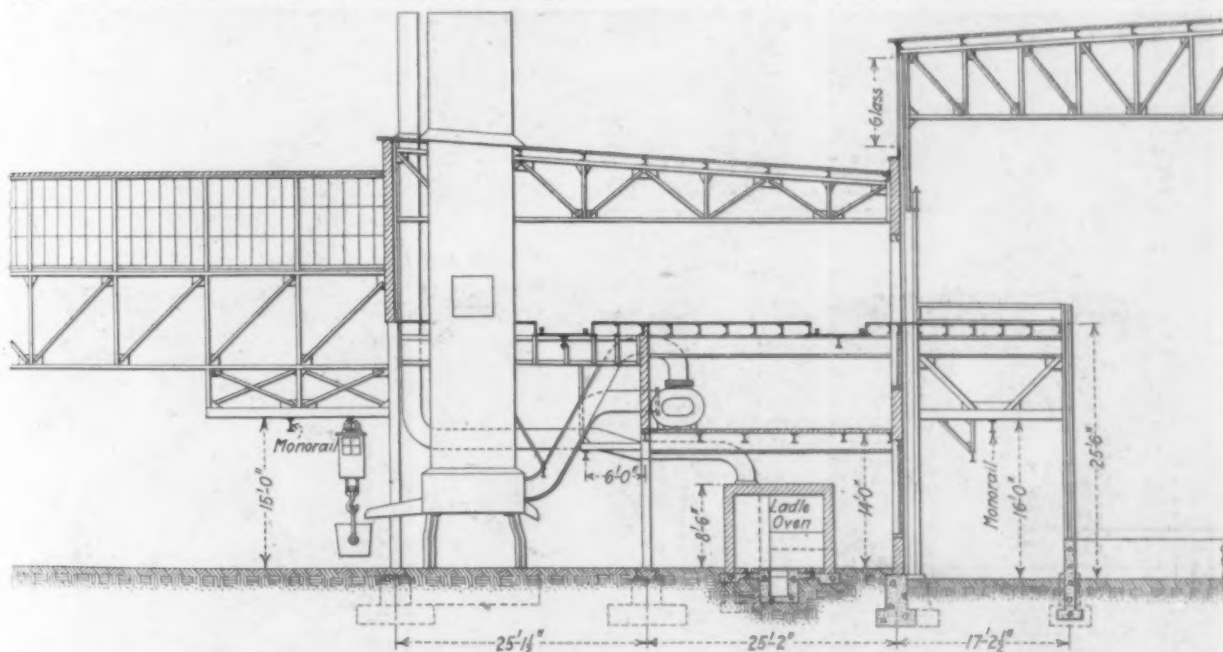
The west bay on the opposite side of the foundry will be used as a molding floor throughout its entire length. This floor is similarly covered by means of parallel crane runways of 16 ft. span dividing the floor area into molding floors 16 ft. wide and 50 ft. long, extending from the column line to the wall. The mold will be made up on

the foundry. By means of these cranes the castings are transferred into the tumblers and subsequently to the grinders and finally to the far side of the cleaning room, where they are picked up on another loop of the monorail for transportation over into the storage building.

Castings to be sand blasted are brought out of the foundry direct to the sand blast rooms. Through each sand blast a loop trolley is hung. The casting is then transferred from the monorail to the sand blast trolley, which is so hung with relation to the sand blast room as to permit the sand blasting of the casting as it hangs from the trolley. After being cleaned the casting is then transferred back to the monorail and carried over into stock. One of the drawings indicates the overhead crane in the cleaning room. There are to be dust arrestors auxiliary to the grinding and cleaning equipment, which are not yet installed.

Warren Iron & Steel Company's Improvements

The Warren Iron & Steel Company, manufacturer of crucible and open-hearth steel specialties, Warren, Ohio, has completed substantial improvements in its plant. Natural gas has been installed for heating the plates in two new and additional furnaces, and much new machinery



Cross-Section Through the Cupola Department, Showing Charging Floor, Ladle Ovens, Etc.

machines of stripping plate type, the machine straddling the long pile of sand and moving out toward the wall as the sand is made up into molds, the molds being laid down on either side following the machine until the floor is filled.

The central bay floor space will be used for snap flask work arranged in two large floors corresponding to the two trolley loops shown in the general plan of the foundry. From the cupolas hot metal will be distributed in 4-ton ladles by way of the monorail. For pouring in the machine floors in the side bay, the iron will be transferred from the monorail ladle to smaller bull ladles hung from the cranes overhead. For the snap flask work in the center bay the hot metal ladle will be transferred from the monorail to the loop trolley and carried around to the point of the floor nearest to the molds to be poured where the metal will be transferred to hand ladles.

The main foundry is separated from the cleaning room by a large locker and wash room inclosed between solid brick partitions which leave only a passageway at either end for the monorail. The cleaning room equipment provides for the installation of four sand blast rooms, 10 x 16 ft., of which two will be completed at this time, two rows of tumbling barrels arranged across the room 14 tumblers in a row, and 14 stands of double end emery grinders. Castings intended for tumbling and grinding are brought from the foundry on the monorail into the south side of the cleaning room. Here, overhead cranes of 3-ton capacity are installed in the same manner as in

added, in the department in which are manufactured rolling coulters blades and concave discs for cultivators, grain drills, harrows, plows, etc., greatly augmenting the output and improving the efficiency of the department. The company's business in this line has recently developed to such an extent that the disc and coulters shop is assured of being kept in operation double turn until next May or June. Other improvements comprise a new 30,000-gal. water tank on a steel tower 30 ft. high; an entirely new roof on the main buildings, wareroom and boiler house; modern and sanitary closets for the use of operatives; the rebuilding of heating furnaces, etc., and the installation of a 150-ton track scale.

The company also produces shovel plates and high grade open-hearth steel saw plates, and its various products are now finding a market over a large part of the United States and Canada.

The American Welding & Mfg. Company, Milwaukee, Wis., recently executed a rather unusual piece of work in connection with the construction of the new 16-story First National Bank Building in that city. Utilizing the oxy-acetylene welding process, the company constructed and erected two 120-ft. flagstaves on the top of the building and, but for bolts in the base anchor, used nothing but the welding process for the construction. The staffs weigh one and one-half tons each and are of steel tubing, 9 in. in diameter at the bottom and tapering to 5 in. at the top.

Prevention of Accidents in the Foundry

Methods Which William Sellers & Co., Inc., Have Employed with Excellent Results—Number of Burns Much Less

BY ALEXANDER E. OUTERBRIDGE, JR.*

Since the year 1906 systematic records have been kept of accidents occurring in all departments of the works of William Sellers & Co., Inc., Philadelphia. At first only major accidents, or those which seemed likely to cause serious results, were reported; but it was soon found that if discretion were given to foremen in the matter, the value of such records would be largely nullified by the element of "personal equation" entering into it. The rule was made, therefore, that all accidents, no matter how trivial apparently, must be reported promptly on printed forms provided for this purpose. These sheets have headlines to be filled in by the foreman, giving the name,

perience the writer is able to deny emphatically that anything of the sort has developed. On the contrary, accidents have diminished in number, and a feeling of good fellowship between employees and employers has grown up which is a valuable if intangible asset. Specific illustrations in support of this contention could be given.

Falling Objects a Chief Cause of Accidents

In 1912, toward the close of the six-year period, a compilation and classification, under nine principal headings, of all accidents that had occurred during that time, was made and some rather surprising results were shown.



First Pouring of Molten Iron Over Canvas Legging Buckled Around a Wooden Post Inserted in an Old Shoe. Print from untouched negative; exposure 1/50 sec.; time 3.35 p.m.



Second Pouring of Molten Iron Over the Same Legging as Nos. 1 and 3, Showing Iron Covering the Foot Portion and Pouring Over the Shoe. Print from untouched negative; exposure 1/50 sec.; time 3.40 p.m.



Third Pouring of Molten Iron Over the Same Legging as Nos. 1 and 2, Showing Iron Covering the Foot and Pouring Over the Shoe. Print from untouched negative; exposure 1/50 sec.; time 3.45 p.m.

nationality, age of operative, length of time employed, occupation, nature of accident and time of day, name of witnesses, if any, and several other particulars.

This form, when filled out and signed by the foreman, is sent to the office, where a record is made, and the paper is then handed to one whose duty it is to make a careful investigation of all the circumstances, examining witnesses, etc., not infrequently visiting the injured man at his home or in a hospital, as the case may be. In this way the true cause of the accident is usually ascertained and liability of a recurrence, if possible, is removed. But the work does not end here. It now often assumes a quasi-philanthropic aspect, this feature having grown in importance each year. When it was first proposed to contribute toward the expenses of the family of an employee who was injured, perhaps through his own lack of due care, or through unavoidable circumstances, the fear was naturally entertained to some extent that this would, in itself, tend to make men careless and thus to increase the number of accidents; also that some men would endeavor to obtain money on specious pleas. But after several years' ex-

*Metallurgist William Sellers & Co., Inc., Philadelphia.

Thus, the largest single percentage (29.71) of accidents occurring during the entire period of six years was found under the general heading "Falling Objects." This included dropping of wrenches, mandrels, castings, cutting tools, steel bars, pig iron, or other objects on the feet of men; also, the falling of castings, pig iron, or other objects insecurely piled, or perhaps jutting into gangways. Practically all of these accidents came under the class of "preventable." Most of them indicated carelessness on the part of one or more persons. A circular notice was then prepared and sent to the heads of departments and foremen, as well as gang bosses, suggesting greater care in keeping gangways clear of all overhanging obstructions and that examinations be made of all piles of iron, wood, etc. The result was an immediate "house cleaning," including the removal of many articles that had lain undisturbed for long periods of time, thus contributing to the safety of the operatives and to the neat appearance of the shops.

Prevention of Burns in the Foundry

The foregoing remarks apply to the general principles adopted in dealing with all accidents in all departments of

the works. The writer has been especially requested, however, to give an account of methods adopted to prevent accidents in the iron foundry, and will therefore confine himself in what follows to that branch of the subject.

A study of the compilation and classification of accidents during six years showed that more than 90 per cent. of all accidents occurring in the foundry are to be found (as might be expected) under the general heading, "Burns." The burns occur mainly from splashing of molten iron from ladles, or sputtering from molds. In the former case legs and feet are usually burned; in the latter case eyes, head, face, arms and hands suffer, but eyes are the most vulnerable. In studying the question of devising the simplest and best practicable means of preventing burns in the foundry it was necessary to take into consideration the class of labor employed. The unskilled labor in the foundry, i.e., the men who carry ladles of molten iron from the cupolas to the molds and those who assist in "pouring off," are mainly foreigners of a very low order of intelligence. Often they do not speak or understand English and are improvident, or rather penurious. They wear usually old shoes that are cracked on the uppers, loosely tied with strings. They are a

and the demand for leggings grew, requiring new orders. At first many men wore the leggings under their trousers, so as to conceal them, but they soon found it was far better to protect their trousers or overalls by wearing the leggings outside.

An idea of the effectiveness of this method of meeting this problem may be obtained from the simple statement that a recent compilation of all accidents occurring to September 4, 1913, shows that since the introduction of leggings in the foundry, April 9, 1912, there are but two cases on record of burns on feet or legs, and in neither of these were the leggings worn.

It was the original intention to soak the leggings in a fireproofing solution, but this was found unnecessary, as the texture of the canvas is so close that sparks and globules of molten iron rebound from the surface, and even when sufficient molten metal has fallen on the feet of men thus protected to set fire to the canvas it is quickly beaten out. Experience suggested some important improvements in the leggings, a sample of the new design was submitted by the manufacturer and approved, but photographs can not be made in time for use in this article.

Illustrations of the protection afforded by canvas



Side of Paper on Which Iron Was Poured



Pouring Molten Iron Over a Sheet of Wrapping Paper Laid Loosely on an Iron Plate; Also a Sheet of Paper Upon Which Iron Had Been Previously Poured. Print from untouched negative; exposure 1/50 sec.; time 4 p.m.



Reverse Side of Paper Showing Slight Effect of Molten Iron

peripatetic class—here today, gone tomorrow. In some foundries it is reported that the men engaged in this work are compelled to wear congress gaiters (shoes with elastic sides), which are in some cases bought wholesale by a foreman and retailed to the men at a profit to himself. This plan (even if practicable) is objectionable, and was therefore not considered at all. Short canvas leggings of special design, having a great flare at the bottom so as to cover the shoe to the toe, fastened by means of three strong spring clasps, were ordered to be made at a large military equipment factory. The leggings are bound with leather edging and have a strong strap passing beneath the shoe. They are made of finely woven canvas and are inexpensive. These leggings are placed in the care of the boss of the laboring gang, who furnishes them daily to each man who wishes to wear them, just before the casting commences. They are adjusted in a moment and are returned at the end of the heat.

The first dozen pairs of leggings were put in service April 9, 1912. No compulsion was used, and at first the molders smiled and did not ask for them. One man, however, was seriously burned on the foot about that time,

leggings are given in the accompanying views, showing three successive pourings of molten iron over one canvas legging which was buckled around a wooden billet inserted in an old shoe to represent a human leg. The canvas legging did not catch fire and was not even charred, although the molten metal covered the portion over the shoe, as plainly shown. These tests, showing pouring of molten iron over a canvas legging exceed in severity ordinary every day conditions where legs and feet of men are protected from burns, from splashed metals by the leggings. Further proof of the surprising fact that molten iron may be poured over an inflammable material without setting it on fire is given by the experiment in the fourth view. Here iron was poured over a large sheet of wrapping paper laid loosely on an iron plate. The dark spot in the upper portion of the paper shows where the stream of iron struck it. Neither the legging nor the sheet of paper was treated with any fireproofing substance. Remarkable proofs of the idea that molten iron can be poured over an inflammable material without setting it on fire were given in investigations begun by the writer in 1886 in the carbonizing of delicate fabrics, lace, fern leaves, etc., and

using these as facings for molds, from which replicas were obtained in metal showing every detail. In the tests shown in the accompanying illustrations the carbonizing is omitted, but the principle is similar, namely, that during the brief time the molten metal covers the material oxygen of the air cannot reach that portion to combine with and ignite it. The metal is gone too soon to heat the material to the point of flaming afterward.

The Use of Goggles in the Foundry

Soon after the adoption of the leggings various kinds of "goggles," or eye-protectors, were purchased for test. Some were tinted; some had perforated leather side flaps or fine wire gauze at the sides; some were ordinary automobile goggles. All of these were objected to by the men for one cause or another, the chief one being the dimming of the glasses from moisture. This led to the adoption of perfectly plain untinted round glass eye-protectors without any wire gauze, which prevents free circulation of air. These goggles cost about 10 cents a pair and are furnished daily to the men asking for them when they obtain their leggings.

Since the adoption of these eye-protectors there have been no eye injuries reported of men wearing them, but

several pairs of the glasses have been struck by molten iron and cracked. In at least one case it is certain that the glasses saved both eyes of the man wearing them. An explosion of a wet mold occurred, throwing molten iron directly into his glasses and face.

The eye-protectors are stored in a box and are kept in clean condition. Those cracked or broken are placed in the museum. The gang boss is directed to keep a record of all cases where serious burns have been avoided by the use of the leggings and eye-protectors. In the early stages of these methods this man was given a pass book in which he entered the names of men pouring iron who did not ask for the protection, or who declined to wear leggings or goggles, but that has been discontinued long since.

In conclusion, the writer will say that he was gratified to learn from the letter of the editor of *The Iron Age* asking for this information that "the representative of the Bureau of Labor at Washington, who carried on the inspection of iron and steel works last year and the preceding year, has spoken with high commendation of the precautions taken by your company to guard against accident in the foundry." These precautions have the merit of being simple, inexpensive and effective. They are applicable in all foundries, large or small.

New Addition to a Hamilton, Ohio, Foundry

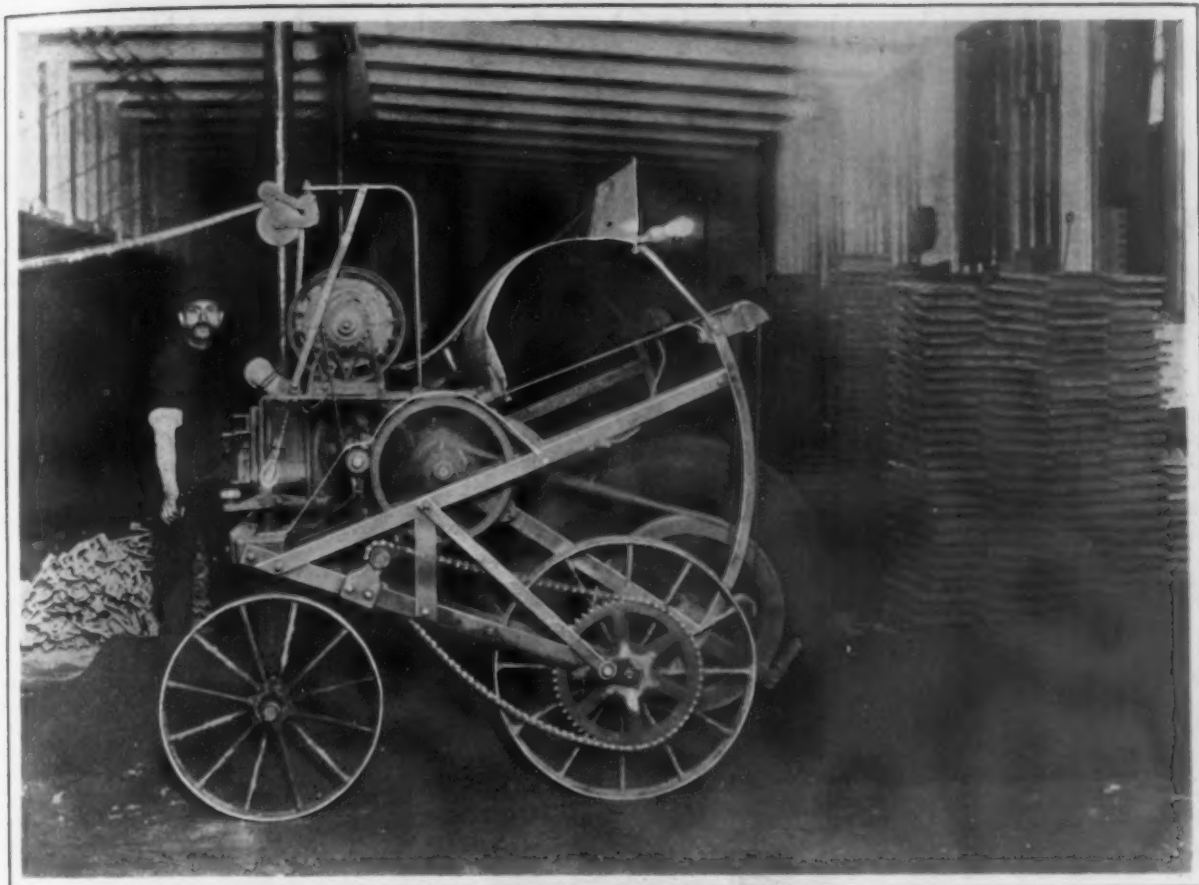
Large Numbers of Small Castings for Which Molding Machines Are Used—Mechanical Sand Cutting and Trolleys for Hand Ladles

A new building has recently been added to the plant of the Hamilton Foundry & Machine Company, Hamilton, Ohio, and for the suggestions it may give to the foundry industry some information has been obtained of the equipment and operation. The output is conspicuous for the generally small unit sizes, some of the castings, for ex-

ample, weighing no less than 1600 to the pound, which is 0.01 oz. each. Many of the castings are intricate, requiring molds with numerous small channels through which the molten iron must flow, and a gray iron of high silicon and phosphorus is used, except where special tensile strength must be obtained.



Interior of the New Foundry, Showing the Ladle-Carrying Rail Overhead



The Electrically Driven Sand Cutting Machine Operated at Night

The molding is done generally with molding machines, the exception being the very small work, and there are, all told, in the plant some 100 molding machines, about equally divided between the Mumford and the Tabor manufacture. The new building gives the plant a total of 150,000 sq. ft. of floor space.

One of the accompanying views shows the interior taken from a point on the center line of the building, and the arrangement is typical of all three of the main foundry buildings. The molding machines are located along each side, with the operator facing a large window which extends almost to the ceiling. This gives abundant light where it is needed, but there is a monitor type roof providing for natural illumination for the central spaces.

The molds are poured from individual ladles, but to minimize fatigue of the molders and to expedite the handling of the metal, an overhead trolley is provided from which ladle carriers are suspended. This is shown in the illustration. The cupolas, of which there are two of the Whiting manufacture, are located near the center of the foundry, at one side, and each ladle weighing about 60 lb. when filled, is taken by the molder to the central trolley system, where he can place it in the carrier, of which there are a number. The molder then needs simply to push his ladle in its carrier opposite the point where his molding floor is located and then removing the ladle from the carrier pour off his molds. The trolley system was installed by the Coburn & Crowley Company, Holyoke, Mass.

One of the labor saving devices in use in the foundry is a sand cutting machine built by the Sand Mixing Machine Company, New York City. A view of it with the sand pile which it has cut is shown in the second of the two illustrations. In its main details it has already been described in these columns, but briefly it is a self-propelling machine, electrically driven, which as it moves along the foundry floor churns up the sand which has been shaken from the poured molds together with the fresh supplies added to it, leaving the sand tempered and again ready for use. The machine is equipped with a 110-volt motor and the operator taps the flexible electrical connection into a socket, one of which is suspended from the ceiling about every 50 ft. The sand cutting work is done at night, and it is found that with the apparatus one man can cut, mix and collect enough sand in 8 hr. to supply 100 molders the next day.

In adopting the molding machines, which was done in 1891 after considerable experimental work, and in establishing a wage payment system in that connection, the company lays claim to an exemplary record in not deviating in all that time from the piece work scale agreed to at the outset. The wage scale was intended not only to enable the average workman to make a day's pay on the piece work plan but also with a view of helping the ambitious and skillful individual to increase his earnings. In the case of the smaller castings, of course, the actual numbers are not counted, but on the basis of careful estimates, the numbers are calculated from weights of the finished products. After a period of only six months' service, the average wage of a workman is about \$1000 per year, while the more experienced make considerably more.

A ring gauge for standard and extra heavy pipe threads has been adopted by the standardization committee of manufacturers of valve and fittings, with the approval of a committee of the American Society of Mechanical Engineers, and the committee on International Standards for Pipe Threads and the Pratt & Whitney Company. A table of the sizes of the plug and the thickness of the threaded gauge ring has been issued by the committee of the manufacturers, and a copy of it may undoubtedly be had by addressing W. H. Douglas, secretary of the committee, 30 Church street, New York City. The gauge is an application of the Briggs standard, and a set of gauges to be known as the American Briggs standard for pipe threads has been deposited with the Bureau of Standards, at Washington, D. C.

The Cleveland office of the Allis-Chalmers Mfg. Company has taken an order from C. M. Walsh, Cuyahoga Falls, Ohio, for a hydroelectric plant, which will furnish power for the Falls Rivet & Machine Company and the Walsh Milling Company. The equipment to be furnished includes two 250-hp. water wheels, two 150-kva. generators, excitors, governors, switchboards, etc. The Allis-Chalmers Company has also taken an order for a hydroelectric plant to be erected near Kent, Ohio, for the city of Akron. This will include a 300-hp. and a 100-hp. water wheel, a 250 and a 75-kva. generator and complete equipment.

A Difficult Steel Casting Hard to Ship

One of a Variety of Iron and Steel Castings
Which Required Special Attention to
Design—Shop Facilities and Transportation

Some large size and difficult castings of steel involving some problems of railroad transportation were recently completed by the Pittsburgh Valve, Foundry & Construction Company, Pittsburgh, and the Wheeling Mold & Foundry Company, Wheeling, W. Va., for use on a water-power development at Preston and Alexandria, Idaho. The work represents a contract placed with the former company in the spring of 1913 by the Electric Bond & Share Company, New York, for what are known as the Grace and Oneida penstocks. The services of the Wheeling company were engaged for making from the Pittsburgh company's designs a part of the contract—a steel cast lateral, so called, for use near the foot of the penstock.

A view of the completed lateral, mounted on the rail-railroad car for transporting it, and also one of the core used in the mold are here shown. The lateral amounts to a junction piece for two 6-ft. channels merging into a 6 ft. 6 in. channel, and it was required that it should be designed for a working pressure of 230 lb. per square inch. In the design finally adopted, all flat surfaces were eliminated and all curved surfaces that could not otherwise be supported were reinforced by means of ribs. Special care was taken to maintain a uniform thickness of metal and at points where the thickness had to be increased, long taper fillets were planned to make a gradual change from one thickness to the other. Several of the leading steel foundries in the country refused to bid on making the fitting, declaring, it is understood, that the extreme size and irregular shape with the comparatively light shell made it impracticable, but the Wheeling Mold & Foundry Company undertook this part of the work and its success appears to have justified its opinion expressed beforehand that the work, though difficult, was not impossible.

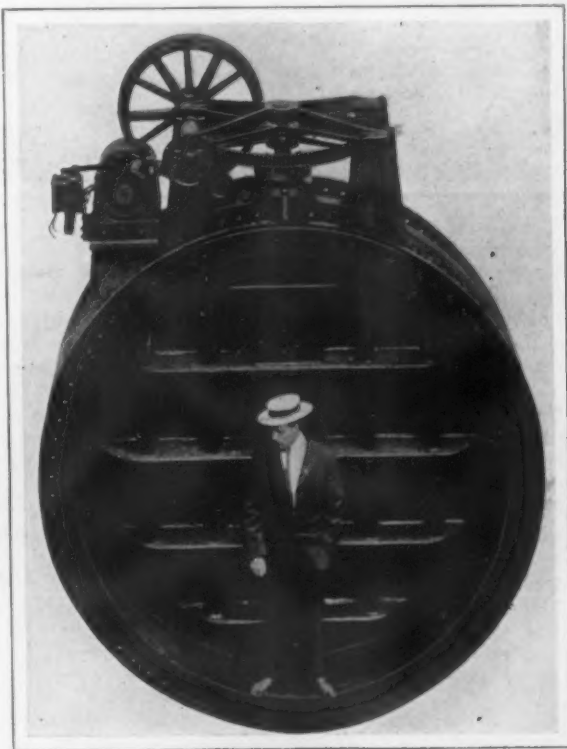
It was required that the finished casting should be subjected to a test of 460 lb. hydraulic pressure, or twice

the expected working pressure. The Wheeling Mold & Foundry Company accordingly machined the flanges of the three openings and constructed three blind flanges for the openings, provided a copper gasket in each case and drilled the flanges to receive the bolts for fastening the blind flanges in place. The test pressure of 460 lb. was maintained for 15 min. without indication of leaking or so-called sweating. About the only difficulty met with in this connection was failure at first to get the gaskets to hold, but this was overcome and the test was successfully accomplished.

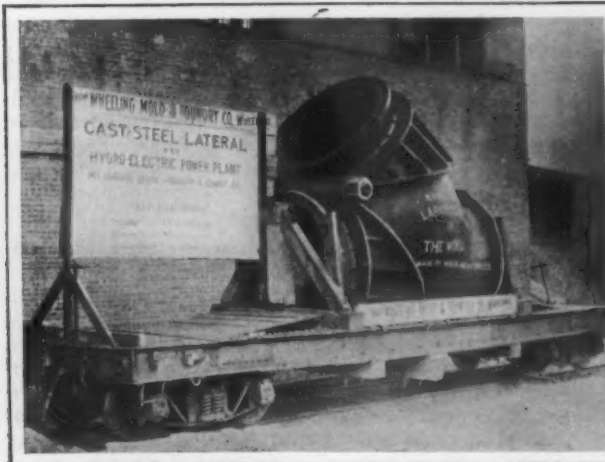
The transportation problem was occasioned by the large dimensions of the lateral. The length on the line of straight pipe is 12 ft. 9 in.; the extreme width, 9 ft. 9 in., and the over-all height or distance across corners as placed on the car, 13 ft. 10 in. The width is in excess of the standard width of the largest car, making the casting project on each side. On account of the height it was necessary to use a gun truck, al-

lowing the lateral to rest between the sills of the car. The normal allowable shipping height over the route proposed is 16 ft., but by special routing and agreement with the railroads, the shipment was put through at a height of 16 ft. 6 in. above the rails. On account of the great distance and the number of different railroads over which the shipment had to be made, it took considerable time to make arrangements and it was also necessary to secure authority to use the special car for a shipment to a point so far west of the territory in which these cars are ordinarily used.

The material supplied directly by the Pittsburgh Valve, Foundry & Construction Company included two butterfly valves for a 11 ft. 6 in. conduit, which valves are probably the largest ever manufactured. They are to be operated by means of a cylinder receiving oil at a pressure of 130 lb. per square inch. A 7-ft. motor-operated



A 7-Ft. Motor-Operated Butterfly Valve



The Steel Cast Lateral Ready for Shipping and the Core Used in the Mold for It

butterfly valve, shown in one of the illustrations, was also built. This is designed to operate in 30 sec. by means of a motor taking current from a 110-volt alternating-current line. A limit controller is attached to stop the motor automatically when the valve is either wide open or entirely closed. Two 5-ft. butterfly valves for controlling the water at one of the dams and two 6 x 6½-ft. rectangular sluice gates with operating stands were also built.

The total weight of the steel castings and cast iron involved was 200 tons, and designs covering all the material had to be approved before work could begin. The interest in the manufacturing lay largely in the large sizes, the high working and test pressures, the shop facilities necessary and, as stated, the allowable limits of size the railroads could accommodate. Besides miscellaneous piping and small gate valves, a part of the order called for two car-loads of 11 ft. 6 in. diameter cast-iron pipe, which had to be made extra heavy on account of their likelihood, otherwise of sagging out of round from their own weight when placed in the position of use. The weight of the lateral is 55,000 lb.

Remelting Iron Turnings and Chips*

A Method of Injecting Them Under Pressure into the Melting Zone Making Briquetting Unnecessary

The usual method of successfully disposing of practicable quantities of iron turnings or chips is in the form of briquettes which are added to the regular charge in the cupola. Repeated experiments with such briquettes, so far as the chemical and physical properties of the iron are concerned, have been attended with satisfactory results, so that iron turnings may be regarded as a suitable and serviceable charging material. There is a new method by which the turnings can be used in their natural state without previously briquetting them and which for some time has found successful application in several large foreign iron foundries.

As illustrated in Figs. 1 and 2 the loose turnings are injected under pressure into the melting zone of the cupola. To accomplish this the inventor makes use of apparatus by means of which, besides the usual charge of about 1000 kg., from 5 to 20 per cent. of iron turnings can be injected into the cupola without, it is claimed, increasing the coke consumption. The operation and conduct of the furnace is normal and the waste is small, as has been established by experiments extending over several months. It is said not to exceed that which occurs in the use of briquettes. Therefore the advantages which this invention offers, as compared with the briquetting of turnings, should have a wide application in industrial lines.

The apparatus for injecting the chips or turnings of iron is shown in cross-section in Fig. 1 and as it appears

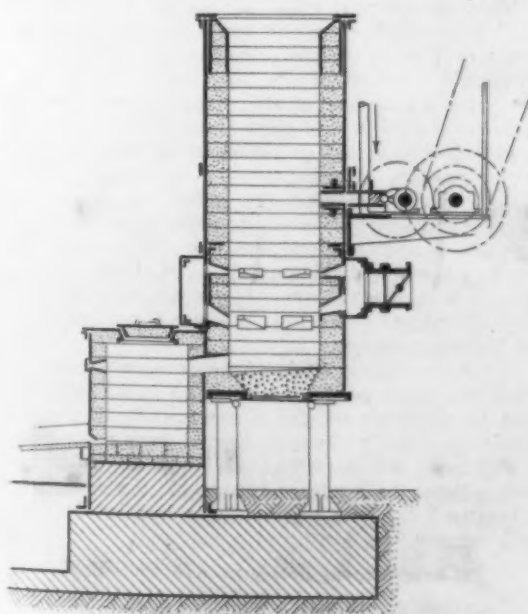


Fig. 1—Cross-section of Injection Apparatus

*From Gresserei-Zeitung, September 15, 1913.

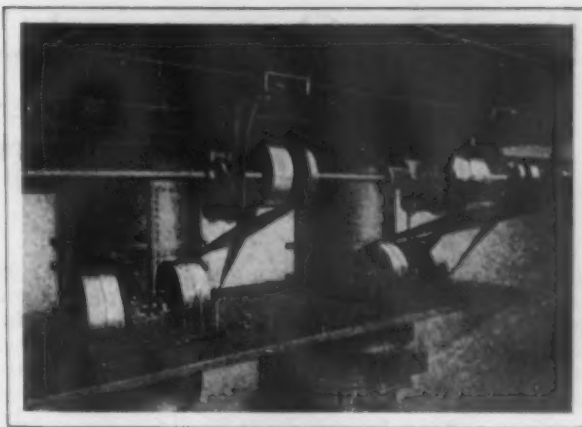


Fig. 2—Injection Apparatus as Installed

installed in Fig. 2. It consists essentially of two cylinders situated close together, in which a piston is made to move back and forth by means of a crankshaft or an eccentric. The propulsion of the machine is accomplished by means of a connecting gear or a suitable motor. In order to render the movement of the machine free from shock, a small balance wheel is connected to the crankshaft near the motor. Further, in order to be able to inject the desired percentage of turnings, the propelling mechanism is regulated by means of two speed pulleys which hasten or retard the rate of the machine at will. By regulating these speed pulleys, 5, 10, 15 or 20 per cent. or more of iron turnings can be injected into the melting zone.

It is stated that a foundry in Berlin has installed this apparatus and by means of it will shortly attempt to turn to account its large amount of waste iron. It will then be demonstrated to German founders whether results equal to those claimed for other countries can be attained.

Book Review

Shop and Foundry Management. By Stuart Dean. Pages 220, 6¼ by 9 in. Cloth. Published by *The Iron Age*, New York. Price \$2.

This volume is largely a reproduction of the articles which appeared in *The Iron Age* at various times in the past year. Mr. Dean is superintendent of the Dean Brothers' Steam Pump Works, Indianapolis, Ind. The book presents practical shop and foundry methods that have resulted in lower cost and higher output, and cover every phase of the business. Theory is not presented, the purpose being to point out how and where money can be saved and efficiency increased. The methods given are particularly applicable to establishments employing from 100 to 400 men.

There are 22 chapters including, besides those devoted to cost keeping, several interesting ones on "Designing Patterns to Save Machining," "Ways of Losing and Saving Castings," "Economies in Foundry Mixing and Melting," "Economies in Mold Making in the Foundry" and "Arranging Patterns for Molding Machines." In treating of foundry mixtures it is shown how savings can be effected by making the iron mixture according to analysis; also how varying proportions of the metalloids affect the properties of the castings. The points brought out in this one chapter are full of suggestion to the metallurgist, and all of them of great practical value to the foundryman. The machine shop is also discussed under such titles as "Making a Success of the Machine Shop," "Little Economies of Machine Operation," "Selecting the Correct Machine for the Work" and "The Machine Finishing of Cylinders."

Based on 13 years of thorough practical experience, the data are highly instructive. Mr. Dean was put in charge of the Indianapolis plant 13 years ago at the age of 25. He had worked in the shop during vacations and before he was out of school had learned the machinist's trade. At 18 he went to work in the foundry where he became versed in all branches of operation with the idea of eventually taking charge.

Foundry Output and Convenient Arrangement

Cases of Inefficient Movement of Material—Costly Appliances Not Always a Solvent—To Prevent Congestion

By HENRY MARQUETTE LANE

It would seem that anyone familiar with the shop would try to eliminate useless movements. Yet it is true that one who has been in the shop during its growth becomes familiar with the plant and its changes, so that he does not notice how inconvenient the arrangement may be. An extreme case of this sort came to the writer's attention recently. It was of a foundry that had grown very rapidly. Additions and small buildings had been constructed in various parts of the property, and many of the departments were badly scattered. In the core department the small cores were made on some benches along the windows. The coremakers carried them on an average of 35 ft. to racks near the core ovens. They were then baked and carried to a core storage in an adjoining building back of the core ovens. When wanted, the cores were carried from this building past the core ovens and past the coremakers to the foundry. The result was that the traffic was crossing and recrossing the center of the core room. This resulted in much unnecessary travel and confusion. It also gave undue opportunity for visiting.

The solution was simple. The coremakers were moved out into the building back of the core ovens. The partition between it and the other core room was torn down and a carrier installed to handle the cores from the coremakers to the ovens. A core storage was placed where the coremakers had formerly worked, and the molders were excluded from the core room. When the molders wanted cores they came to the core stock room and got them just as they would get any other supplies. A better arrangement will be worked out later in connection with which the cores will be delivered to the molders as wanted. A shift of this kind sometimes eliminates over 25 per cent. of the help.

A Core Sand Mixing Problem

In another foundry several batch mixers were used for mixing the core sand. The sand was wheeled near to these machines, dumped in heaps on the floor, and from there shoveled into the machines. The mixtures were made by counting the shovelfuls. A study of the conditions showed that with two men shoveling in they frequently made an error of as much as 40 per cent. in volume in some of the ingredients. The shovelfuls were counted whether they were big or little, and then the men often became confused, each thinking the other one had attended to some part of the work. After the sand was mixed it was dumped on the floor, shoveled into wheelbarrows and taken to the core rooms. The binder was not introduced in the mixture until after all the sand was in; hence this portion of the mixing time was lost. The mixing machine had to stand idle while the sand was being shoveled away from under it. These two delays together tied up the machine for more than half of its possible productive time. The consequence was that the sand mixing department had to work nights a considerable portion of the time.

After a careful time study of the apparatus, a mixing system was installed in connection with which the batch was measured in 16-qt. wooden pails. These were placed on a gravity carrier which fed them to a point immediately in front of the machine. One man was given the work of charging the machine. When shoveling the mixture in, it used to take one man $3\frac{1}{2}$ minutes, or two men a little over a minute and a half. With the buckets one man put the mix in in less than half a minute. This gave an increased capacity to the machine due to the longer mixing period available. The machine was boxed in in such a way that the mixed sand fell behind the machine when it was shoveled away by another laborer. The moment the entire charge was out, the bottom of the machine was closed and a new charge dumped in. The man who dumped in the charges also measured out the binder.

When the man was dumping in the pails of sand the

empty pails were returned to the man who filled them, by a gravity carrier. This system divided the duties between the various men, giving each a limited space in which to work, and assigning him certain definite duties to perform. When the system was installed the foreman found he had too many men on his hands. At first there were 19 men in the crew. These were gradually thinned out until 12 men were handling the amount of sand formerly handled by 19. In addition to this, instead of the sand mixing crew having to work two nights a week until 10 o'clock, they had no difficulty in mixing all the sand, besides having nearly an hour each day in which to clean up the department and put things in shape.

A study of this kind requires that the man who is making the investigation be free from other duties so that he may devote his entire time to planning out the best arrangement. In many cases it is necessary to make drawings or layouts of the department, and to shift the various machines or pieces of equipment about on these drawings until the most efficient arrangement is found.

Handling Arrangements Tend to Complexity

One interested in this work must never lose sight of the handling problems involved. For instance, it is a very simple matter to design a large foundry for a given output, allowing the proper floor area for the molders, plenty of area for the coremakers, ample core oven capacity, sufficient melting facilities, and a properly arranged cleaning department, and still to have the plant so congested that the work cannot be got out, simply because the transportation facilities are such that the traffic blocks at certain points in the plant, making it a physical impossibility to get the cores and other supplies into the foundry and the castings out at a reasonable cost.

It is a comparatively simple thing to handle the output of a plant running 20 or 30 tons per day, but when the output runs into the hundreds of tons, and the number of pieces to handle into tens of thousands the problem becomes much more complex. It is to problems of this kind that the engineer has to give his most careful attention.

Convenience in arrangement necessarily means so placing the various pieces of equipment that the men will have to make the smallest number of moves to accomplish the largest amount of work.

Many engineers run into the fallacy of thinking that a multiplicity of conveyors and costly handling appliances are necessary for convenient arrangement and large output. Frequently a system of this kind has a tendency to block the entire production of the plant. A time study on a conveyor system in one plant showed that certain of the operators were losing 40 per cent. of their time waiting for an opening in the conveyor into which they could set their finished molds. The entire loss of time on this conveyor amounted to nearly 10 per cent. of the total time expended by the men, and was more than enough for the men to have placed their molds on the floor at the usual distance from the machine. If the conveyor did not have other advantages it certainly was not a convenience which was increasing output.

In another plant a study of the conveyor system showed that it was undoubtedly slowing down in the entire department to the pace of the slowest workers. In another foundry on exactly the same line of work a given number of employees was turning out almost 40 per cent. more work without the conveyor system, but the operators were so arranged that the material was handled in the most rapid manner possible.

Arrangement Problems Are Individual

The arrangement which might be best for heavy work would not be at all suitable for light work. In like manner the best arrangement for cored work would not be suitable for stove plate.

Each plant presents individual problems, but the two principal points to be borne in mind are: First, so far as possible have everything moved continuously in one direction without back tracking; second, provide sufficient storage places at necessary intervals so as to take care of irregularity in flow of any given product and prevent the congestion due to opposing currents of traffic. Opposing currents of traffic should be avoided, and material made to travel in a circle or some other definite arrangement which will avoid blocking the traffic.

A mistake is sometimes made in thinking that a given line of traffic will serve two purposes, carrying one class of material in one direction and the other in the opposite direction, the back trips from one class of material serving to handle the other. Unfortunately, the two classes of material are rarely ever ready for carrying at the same time, so that the transportation of one is at the expense of the other.

In handling iron ore down the lakes it is in many cases found cheaper to send the ore boats up the lake empty than to send them up with ballast freight. This is particularly true when a large season tonnage must be moved. In like manner, in the foundry, as in other manufacturing departments, it is frequently best to move freight in one direction at a time only, and to return the cars or other carriers empty.

All carrier systems should be flexible and as little subject to break-down as the engineer can make them.

An Inserted Tooth Saw Blade of New Design

For cutting bars, forgings, steel castings, structural shapes, rails, frogs and switches, the Hunter Saw & Machine Company, Pittsburgh, Pa., has placed on the market a saw blade of the inserted tooth type, designed for use in sprocket-driven machines. In designing the blade, the spacing of the teeth and the thickness of the blade were given special consideration.

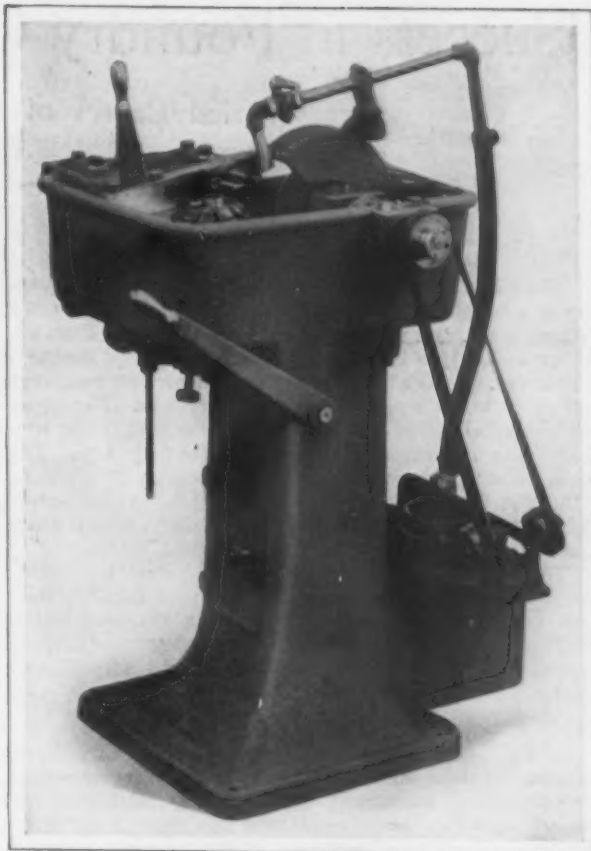
One of the objections formerly urged was that there was considerable space between the teeth. This arrangement, it is pointed out, caused the machine to operate with jerks when small sections of material were being cut. Formerly it was also considered impracticable to have a blade thin enough to withstand the strain at the sprocket holes and to operate without increased power. The new form of blade with a fine pitch and the reduction in the thickness of the blade enables a more economical operation, it is stated, than was possible with the solid blade, while the production is increased by reason of the additional feed that can be applied.

Oil treated vanadium steel is used for the body of the blade, and the teeth are made of high-speed steel. The vanadium steel is used for the blade to reduce to a minimum any chance of the pockets spreading or the sprocket holes becoming distorted. For holding the teeth securely in position, a tool steel wedge is placed at the back, while at the bottom a brass screw with a hexagonal head is inserted to enable the teeth to be assembled at the proper height.

Formed Gear Cutter Grinding Machine

The Cincinnati Gear Cutting Machine Company, Elam avenue and Garrard street, Cincinnati, Ohio, has brought out a grinding machine for use in connection with gear cutters of the formed type. The work slide on which the cutter rests is outside of the pan, so that it is removed from the possibility of damage by water and grit, thus contributing to smoothness in operation, reducing wear, and favoring the continued production of accurate work. The indexing arrangement is also a feature.

A number of adjustments are provided for the machine, among which may be mentioned those for centering the work with reference to the grinding wheel; for positioning the work slide to compensate for variations in the diameter of the cutter and the depth of the tooth; for regulating the thickness of the cut; for giving the desired inclination of the cutter, and to regulate the feeding of the cutter to the grinding wheel. The indexing is obtained by means of a pawl bearing against the heel of the cutter, and it is emphasized that the arrangement possesses the advantages of having little complication and being easily operated. No clamping nuts are used for securing the cutter to the arbor, so that it may be removed at will for



A New Type of Grinding Machine for Sharpening Gear Cutters of the Formed Type

gauging or inspection, while corrections for inaccuracies due to hardening of the cutters or other causes can be made and inaccurate grinding by accidental slipping of the cutters on the arbor is prevented.

The work spindle, which is hardened and ground, runs in bronze bushings having protection against the entrance of grit and being readily adjustable for wear. A long bearing on the pan is provided for the work slide, which has a taper gib, to give the necessary adjustment to compensate for wear. For keeping the grinding wheel face true, a wheel truing device is supplied with the machine. A centrifugal pump supplies the water required during the grinding operation, and there is a settling pan in the water tank to separate the emery dust and steel grindings. From the settling tank, the water flows to a reservoir from which it is pumped to the grinding wheel.

A countershaft, upon which tight and loose pulleys, 8 in. in diameter, with a $2\frac{1}{4}$ -in. face, are mounted, is used to drive the machine. The speed of the countershaft is approximately 350 r.p.m. Including the countershaft, the weight of the machine is about 1200 lb., and the floor space required measures 31 x 41 in. The equipment regularly furnished with the machine includes a countershaft, the wheel truing device, the necessary wrenches, center gauges and five sets of bushings for holes ranging from 1 to 2 in. in diameter. An attachment for grinding cutters having inclined teeth can be furnished, if so ordered. When equipped with a 10-in. grinding wheel, the machine will handle cutters up to a maximum diameter of 10 in. and of 1 diametral pitch.

Termination of the receivership of the old Allis-Chalmers Company is in prospect. Judge Geiger of the United States District Court, Milwaukee, has signed a decree of distribution, and as soon as the receiver and purchasers of the bankrupt concern's assets have concluded their account an order discharging the receiver and terminating the proceedings will be entered. The total of all moneys to be paid out to creditors is \$3,863,211.07. Gen. Otto H. Falk has been allowed \$36,666.66 compensation as receiver, and outside of a few claims allowed in full, on account of security by bonds, the distributive share will amount to 27.757 per cent. General Falk is president of the new Allis-Chalmers Mfg. Company, which is a complete reorganization of the old concern.

Success in Foundry Operation Not Simple

Varied Causes of Failure Illustrated by Examples Which Are Typical—Remarkable Supervision in an Automobile Shop

RY WARD H. DEAN

There is a great difference in foundries. In a Western city is a large foundry making Corliss engines and heavy jobbing work. As a green journeyman from the East, the writer took a job of molding in this particular foundry. The foreman was a fine old fellow, but nervous and worn out from heavy responsibility and overwork. The gangways were cluttered with sand and scrap iron. The windows were blackened from years of foundry dust. The flasks were piled in indiscriminate heaps. A veritable ruins was the flask yard and many a job was bedded in rather than make the heart-breaking hunt for a missing drag.

The foreman fumed and worried because his output was small, yet his molders spent hours of valuable time each day hunting for equipment lost in the sand heaps. Pouring off was a nightmare of stumbling over littered gangways. The office wondered why the foundry department did not pay.

Complicated Machinery

In the Central West is a foundry where they spent \$100,000 on equipment. This was modern equipment—sand handling machinery, jar ramming machines, air squeeze machines, mechanical sand mixing. Molds were shaken out over iron gratings. The sand was conveyed by an endless belt with buckets and returned overhead into hoppers. A pull of a rope and the flask was filled without touching a hand to a shovel. Very nice it sounds to the efficiency engineer. But what happened?

Two years later each molder was cutting his own sand with the old-fashioned shovel. The sand handling machinery was a rusted, worn-out bunch of scrap iron. Sand got into the bearings. Expert mechanics were constantly working to keep the machinery in motion, and at last in disgust this concern turned back to the methods of our forefathers. The time is not yet ripe for complicated machinery in the foundry.

A Well Managed Foundry

Across the street is a second foundry making hot air furnaces. The owner is a foundryman and to-day stands head and shoulders above any one else in an immense output of furnaces at small cost. How did he accomplish this?

A foreman out of work wrote this foundry owner a letter. It was a good letter, telling what wonders this particular foreman could accomplish if put at work in this particular foundry. It laid special stress on the fact that this foreman would increase the output. The owner was a busy man and failed to answer the letter. One day our foreman stepped into the office of the owner, whom we will call Smith. Mr. Smith said: "You are the man who can increase our output. How do you know you can increase our output when you have never seen our foundry?"

The foreman, Brown, answered that he was quite willing to look over the foundry. They went into the foundry at 10.30 A. M. Close to the door was a little Italian working a Tabor air squeeze machine on a 12 x 24-in. snap job. Says Smith, "Count the molds." Brown counted 150 and asked, "Did he work all night?"

On the large floor jobs were 15 to 20 molds closed down at 10.30 in the morning. Each job was rigged on a stripping plate machine. Each molder had his own individual air hoist. Flasks were all iron, made to fit exactly each particular pattern and even the partings were extended in iron to within an inch of the pattern to save securing with gagers. This was a clean shop and an orderly shop, with flasks carefully arranged according to size. Each molder had everything he needed right at his hand and never stepped off his floor. He was paid for making molds and this he did all day long.

After a trip through the foundry Smith asked Brown what suggestions he had to make on improving the out-

put and Brown answered: "Mr. Smith, I have been through many foundries, but this is really about the best managed affair I have ever seen, and I absolutely have no suggestions to make." Smith, with a smile, beckoned Brown, who followed him into a corner where apprentices were at work at bench molding. "Here," said Smith, "was your chance to make good on a suggestion. You see those apprentices? Each one is making a dozen false moves on each mold. His bottom boards are piled so he takes three steps and turns around on each mold, whereas if they were placed conveniently, one motion of the hand would place the bottom board in position. His tools need rearranging so the hand extended with one quick motion touches the desired tool. Each apprentice is losing three minutes per mold on false moves. The man I am looking for to run my foundry is one who watches these small but all-important items; one who can teach a man to use his hands; one who cuts out all false moves in my foundry." Brown did not get the job, but he went away a wiser man.

System Overdone

A large foundry in a Central Western State is run by system with a capital S. There is a system and a system to take care of the system, and an entire building is turned over to system experts and an efficiency squad. There are armies of clerks, and the foundry superintendent looks out through the glass windows of his office and sadly watches the efficiency engineers running his foundry. His hands are tied in red tape. This foundry makes a lot of scrap and changes its foundry superintendent about every three weeks. At present the company is about on the rocks. Too much system.

The Successful Automobile Foundry

Automobile castings are the highest type of foundry work. There is a great deal of core work. The sections are very thin. A speck of dirt the size of a pin head in a mold spells scrap heap. The castings are tested to hold pressure, meaning a close-grained iron, but still an iron that is already machined. The writer worked for a large Detroit automobile foundry and one which is to-day probably the very best in point of perfection of its castings and large output per man. All this fine molding output is turned out with foreign labor, Poles and Italians equally divided. In this foundry are probably not more than 10 to 15 English-speaking molders. Foreigners are taken raw from the streets and are manufactured in one month's time into careful workmen. This company can laugh at labor trouble, because if the whole place went out on strike to-day, in one month's time there would be another organization almost as good, hired from immigrants and broken in by the concern's system of teaching. How is this accomplished?

In the first place, the foundry has a wise superintendent, who in turn has a very good general foreman. He in turn has a corps of efficient foremen, who are in reality molding teachers. The patterns are perfectly made, so that tooling of molds is absolutely unnecessary, and in fact prohibited. The designs have been worked over until they are marvels of simplicity. For instance, the automobile cylinder, which is a nightmare when made en block, is simplified by making in sections on Pridmore rockover machines, each section being merely a tube with one main core. The water jacket is stamped from copper in a machine shop, removing a second nightmare from the foundry. The valve chamber is a separate casting and all are bolted together into a complete cylinder in the machine shop. The castings are protected from dirt by skimming cores. The patterns are all mounted on molding machines, principally of the rockover type, with molders working in pairs—one making drags and the other setting cores and making copes.

The molders are placed according to race, Poles working next to Italians, so there will be no talking and visiting between molding floors. All is, of course, piece work. Some of the larger work—for instance, a six-cylinder crank case, is turned out by molding gangs of four to six men, each with his specialty. Two handy men ram drags on a large air controlled rockover machine. One man rams cores while two men finish and set cores and close down and clamp ready for pouring. The foundry is highly specialized.

The underforemen are spending ever minute of the day teaching these foreigners how to use their hands to best advantage, and closely inspecting the molds before closing down. These foreigners are their children, so to speak, and they take a pride in them and in making them careful workmen. An organization of this kind is bound to succeed. It is a little army, with a wise general at the head, and a colonel with his captains and trusty lieutenants. The rank and file take on the pride of the regiment, and under the watchful eye of the captains and lieutenants become good soldiers proud of their work. There is not a foundry in Detroit but has a few molders turned out by this school.

The Jobbing Shop

The ordinary jobbing foundry is a hit-and-miss affair. Very few have grown rich in the jobbing business. The owner, formerly a molder or a foreman, has no clearly defined idea of what his costs are. He has a vague notion that his melted metal running from the cupola spout costs him around one cent per pound, including raw pig iron, coke and cupola help. This is a basis for setting his prices. The customer has a year's contract on castings to let out and calls on various competing jobbing foundries to bid on the work. Heavy and light work are all to be figured in on the contract. Then begins cut-throat competition. The low bidder finally gets the contract. He knows he will lose money on the light work but trusts to a special providence to pull a profit on the deal out of the heavier castings.

In about a year's time comes the receiver, or some unsuspecting investor with a little capital steps in and sinks a few thousand dollars and staves off receivership proceedings for a few months longer. Things were so bad in Cincinnati a few years ago that the jobbing foundries actually called a meeting of their customers, and opening up their books for proof said: "Gentlemen, it is either a case of higher prices or boarding up the windows and moving back to the farm."

There are exceptions. In Indiana is a small jobbing foundry whose owner is a shrewd Irishman. He started in with \$1000 capital. To-day he is getting the cream of the trade and is well off financially. He sets a price on his castings at a figure high enough to make a profit and he sticks to these prices. If a customer doesn't like to pay the price he is at perfect liberty to carry away his patterns to a competitor. This foundryman is his own foreman. He has made it a rule to make perfect castings. Even if it is a sewer ring or a manhole, he is just as careful to see that this casting is properly cleaned as if it were a high-grade automobile cylinder. He has worked up a great reputation around his city and out in the State on the excellent quality of his work. His customers are trained to expect perfect work. They now and then are lured away by low bids from other jobbing shops, but owing to the inferior quality of work they generally come back again. He hires the very best of workmen and he is the master workman of them all.

A Foundry and Real Estate Operation

In another Indiana town is a highly successful concern operating four jobbing foundries, which started in on a very small scale. They have combined real estate with the foundry business in the following way. They have hired farmer boys and taught them the trade. In the meantime they have built and sold homes to these boys on easy monthly payments. As a result they have a force of molders who are not making large wages, but who are happy, hard-working, sober and prosperous American citizens; above all, faithful to the concern they work for. This concern is enabled to take large contracts at a very close figure and still make money.

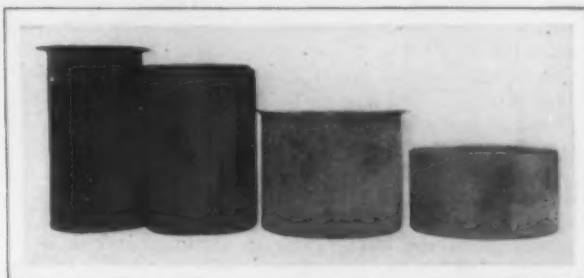
There is a great difference in foundries. Foundries

are as individual as different types of men. Yet after all is said there are only two kinds—the successes and the failures.

Success is often a result of system. Failure may be a result of too much system. Success in a foundry means a combination of many things: common sense and business judgment; hard work and practical engineering skill, and perhaps, above all, a study of the human equation—a thorough knowledge of how to handle men.

A Line of Large Pressed Steel Drums

A line of pressed steel drums in sizes considerably larger than have previously been made is manufactured by the Hydraulic Pressed Steel Company, Cleveland, Ohio. They



Some of the New Line of Pressed Steel Drums Which is Being Manufactured by the Hydraulic Pressed Steel Company

are made as large as 50 in. in diameter and 8 in. in depth, or 40 in. in depth and 24 in. in diameter. They are intended in part as a substitute for open tanks of cast iron or cast steel and they have the advantage of being lighter and are said to be considerably cheaper. Being without seams, they are suitable for receiving an enamel surface and can be used by manufacturers of laboratory equipment. By welding two of the shells together, closed tanks can be formed.

The drums were drawn on a press built by the E. W. Bliss Company, Brooklyn, N. Y., which is said to be the largest double-acting gear-drawing press ever constructed. This press has an 86-in. stroke and a speed up to 4½ strokes per min. It is driven by a 240-hp. motor. The press head is counterbalanced by a hydraulic accumulator. The press is 40 ft. high, and with the motor and accumulator weighs approximately 700,000 lb.

For making the maximum sizes of drums, a blank 64 in. in diameter of 3/16-in. sheet steel is used. The company is prepared to make drums of any size that can be drawn from that stock up to 40 in. in depth. For making various sizes other gauges of stock can be used down to No. 16. In the accompanying engraving, the drum shown at the left is 24 in. in diameter and 40 in. deep and is made of No. 14 gauge steel. The one at the right is 31 in. in diameter and 17 in. high. In the manufacture of this drum 3/16-in. sheet steel was used, while the two in the center are intermediate sizes.

Judge Hough of the United States District Court has appointed Albert M. Maretzek receiver for Patterson, Gottfried & Hunter, Ltd., dealers in machinists' and factory supplies, 211 Centre street, New York, at the request of creditors. He was authorized to carry on the business for 10 days. The alleged bankrupts hold all the capital stock of the Frasse Company, also dealing in machinists' supplies, 30 Church street, amounting to \$25,000. Frederick J. Voss, treasurer, states that the liabilities are \$90,000 and the book value of the assets \$150,000, consisting of merchandise \$90,000, accounts \$42,000, miscellaneous \$16,000 and cash \$2000. The actual value is estimated at \$50,000.

A second ore dock is to be built at Ashland, Wis., by the Minneapolis, St. Paul & Sault Ste. Marie Railway in 1914, according to unofficial announcements. It will be of steel and concrete, and tentative plans call for one of the largest ore docks on Lake Superior. The estimated cost is \$1,000,000.

Casting Parts of a 6000-hp. Gas Engine

Some of the Hooven, Owens, Rentschler Foundry Details in Making the Gigantic Engine for the Ford Motor Company

What is believed to be the most powerful internal combustion engine in the world is installed in the plant of the Ford Motor Company, Detroit, Mich. It was built by the Hooven, Owens, Rentschler Company, Hamilton, Ohio, builder of Hamilton-Corliss engines, and was designed by Edward Gray, an expert in gas engine construction.

The engine uses producer gas and has four double-acting cylinders, 42 x 72 in. in size, two in tandem upon each side, held together with massive steel tie rods and semi-steel distance pieces. It is rated at 6000 indicated horse power when running at 85 r.p.m., which gives a piston travel of 1020 ft. per min. Two of the accompanying illustrations show the engine installed and some idea of its size can be gained from the following dimensions: The length of the engine, set on its foundation, from the front of the pillow block to the end of the tail rod extension is 73 ft. and its extreme width is 32 ft. The crank shaft is 32 in. in diameter in the middle and 25 ft. long, and on it is mounted a 160,000-lb. flywheel. The engine is direct connected to a 2500 k.w. direct-current generator of the Crocker-Wheeler type.

Another one of the pictures shows one side of this engine being erected in the builder's works and gives a general idea of its massiveness in comparison with the medium size steam cylinders and other castings standing nearby. Each bed casting weighed 73 tons and as the design is that of the one-piece bed, special preparations were necessary both in the foundry and machine shop for molding and machining it.

The bed was made in a large concrete pit and to avoid the tremendous stresses acting on a flat bottom, a large plate was first cast, bricked up, finished and dried in the core oven. This plate was laid at the proper depth in the pit in such a way that it formed the bottom of the mold under the flat guide section and on this the pattern was laid. The mold was a combination of loam and sand, which is the usual method employed in this foundry, especially for large castings. The interior of the pan, about half of the outside walls and the cope were sand and all the cores were made of sand.

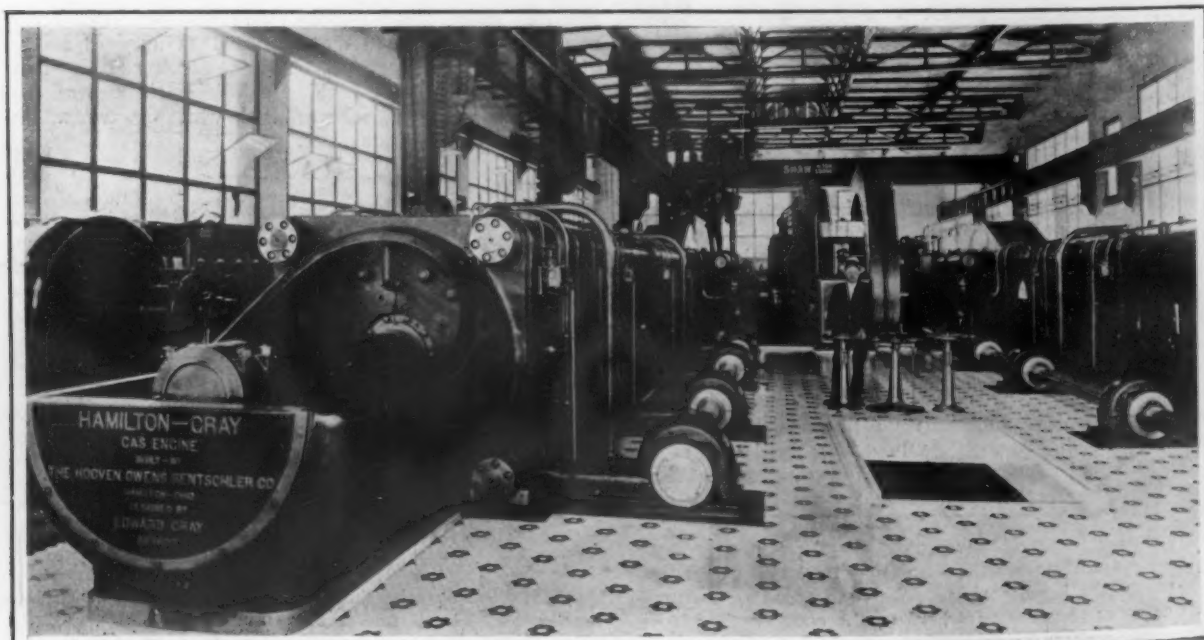
As six 5-in. forged steel tie rods were to be put through the entire length of the bed, some idea can be obtained as to the care necessary in the core making and core setting. The casting was of semi-steel having a tensile strength of

36,000 lb. per square inch and the mixture was melted in two cupolas. To avoid unequal temperatures, the metal was poured from a common runner, the down gates being led from this to the mold. Each gate was stoppered and numbered so that each one could be opened by the molders at a given signal from the foreman in charge. Where metal is poured directly into the molds from different ladles and from different cupolas it frequently happens that the matter of uneven temperature is overlooked. In castings of this character the unevenness of temperature is overcome to a great extent by employing the one common runner basin from which all gates are fed according to pre-arranged signals. To have one end poured hot and the other poured cold would set up unequal cooling strains, detrimental to the casting and might result in internal strains, cracks or other defects that may not become apparent for a long time. The basin being fed from all ladles acts as a mixing chamber for the metal before entering the mold. Another advantage in this method of pouring a large casting is the minimizing of the danger of leaving dirty spots in the casting, as in work of this character this particular feature must be watched very closely.

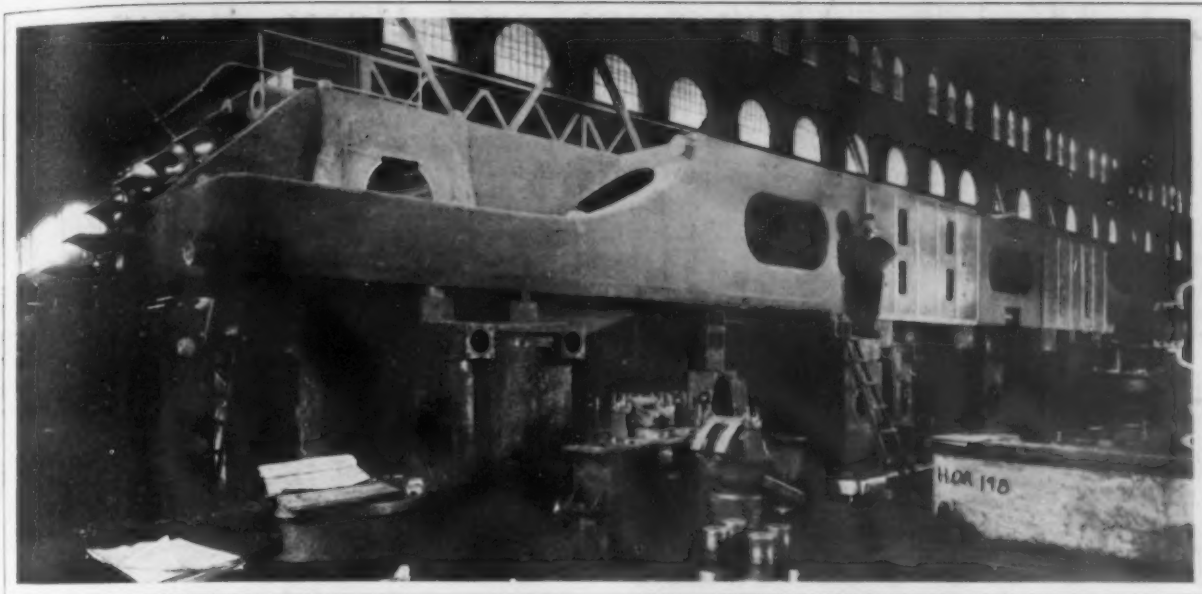
As the pan of this bed was nearly 4 ft. above the level of the joint it can easily be realized that the stress on the mold in carrying this amount of molten metal was considerable; however, the pit in which this bed was cast was of the bolting down type and the copes were well-designed castings and the danger from excessive strains was reduced to a minimum.

The problem of lifting large castings of this kind from the pit was solved by the use of an equalizing beam so that all three of the 30-ton cranes in the foundry were employed in this operation. The bed casting was loaded on a 100-ton service car and carried across the street to the machine shop for finishing and erecting. It was only left in the sand five days, being cool enough to handle by that time.

Probably the more difficult castings to pour were the cylinder heads, although these weighed approximately only 4 tons. The best way to describe the cores would be to state that they were fairly knotted together in assembling, as the castings were of a very complicated kind, so many orifices for water and gas being necessary. Some idea of their complex construction is evidenced by the fact that it



View Showing Most of One Side of the 6000 Hp. Engine in Ford Motor Plant Using Producer Gas



The Engine Being Erected in the Works of the Hoover, Owens, Rentschler Company.

took two men 7 days to clean the cores out of each of these castings. Notwithstanding the immensity of the job not a single casting was lost or spoiled and the large cylinder castings came from the sand practically without a blemish.

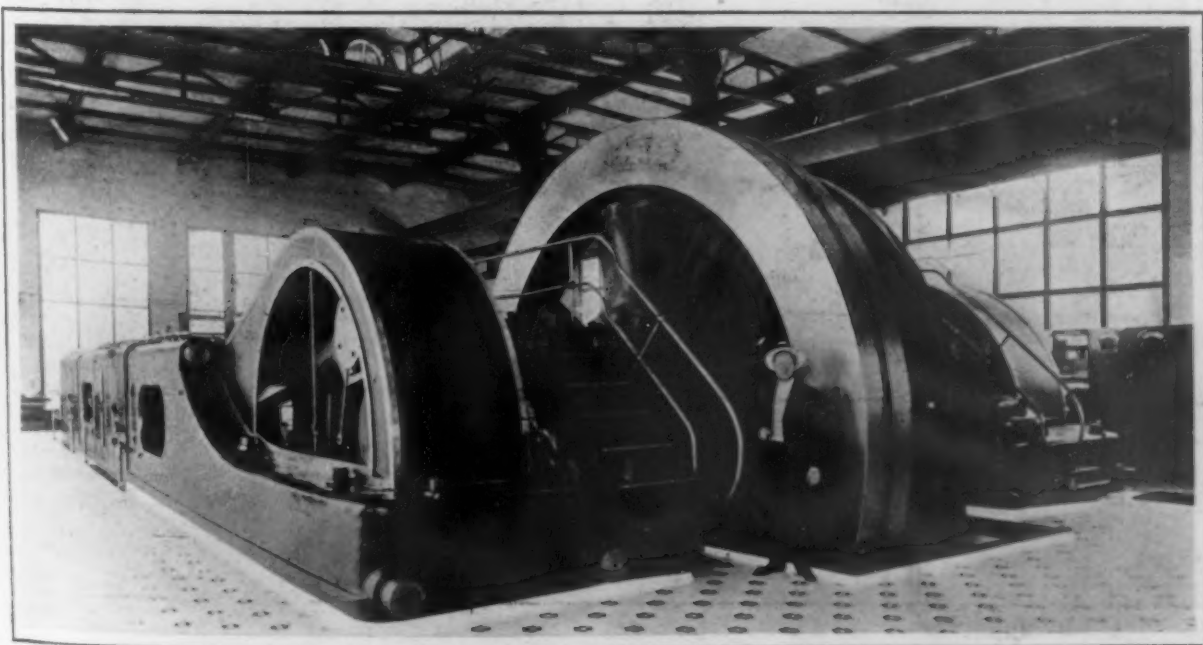
The Ontario Power Company, Niagara Falls, Ont., Canada, is preparing to build a third supply pipe from its gate house above the cataract to its power house on the lower river bank below the falls. It is expected that construction can be commenced early next spring. The pipe will be of reinforced concrete, 18 ft. in diameter, and will admit a flow of 4000 cu. ft. of water per second. It will cost about \$1,000,000 and will require nearly two years for construction. The first pipe line built by the company was of steel and the second of reinforced concrete, both of the same size and construction as the proposed new line, which will cover the company's full allotment of water diversion under the international treaty.

Rapid progress is being made on the building of 54 concrete block homes in the Minnesota Steel Company's model town at Spirit Lake, Minn. Between 500 and 600 men are employed at the site. The average cost for each house will be \$1,200.

The Philadelphia Foundrymen's Association

The Philadelphia Foundrymen's Association held its regular monthly meeting on the evening of October 1, at the Hotel Walton. The paper for the evening's discussion was on "Compressed Air Equipment for the Foundry" presented by Arthur F. Murray, equipment engineer, Blake & Knowles Steam Pump Works, East Cambridge, Mass. The paper was illustrated by some 50 lantern slides. Mr. Murray said, in part, that the strides which have been made in the perfecting of foundry equipment had been great, but had not generally been brought to the attention of foundrymen. Developments have been along the line of foolproof machinery as well as toward equipment of the inclosed type, so as to overcome the wear due to dust and dirt. He referred particularly to various types of Clayton air compressors, adapted for a variety of purposes, more particularly the inclosed vertical type for small foundries and the larger horizontal inclosed types for heavier duty. In the course of his remarks he also referred to machines adapted to both foundry and core-room purposes, particularly jarring molding machines, pneumatic riddles, etc.

A good delegation of local foundrymen will attend the convention of the American Foundrymen's Association to be held next week at Chicago.



The Crank Ends of the Double Tandem Hamilton-Gray Engine Indicating 6000 Hp.

A Modern Aluminum and Brass Foundry

United Foundry & Machine Company's Works,
Bridgeport, Conn.—How Special Study Has
Improved the Casting of Aluminum

The United Foundry & Machine Company, Bridgeport, Conn., is operating on a full commercial basis a new aluminum and brass foundry which affords an interesting exposition of the advances that have been made in the past decade in the science of casting aluminum. In the

equipment, which gives a capacity of 15,000 lb. of aluminum and 10,000 lb. of brass per day, and in the practice employed the foundry represents the latest word in the industry.

The building is of brick, with steel trussed roof, 100 x 171 ft., one story and basement. The foundry proper is 100 ft. square. A temporary wooden lean-to at the rear houses the core ovens, which are shown on the plan as within, instead of outside of the main room. The walls have been given the greatest possible window space, and the monitors have large skylights, which are operated by the Drouvé system of control. The lighting and ventilation are all that could be desired. In the basement is a room in which are located the Norwalk compressors, and also a large vault that provides for ample pattern storage. At the front of the main floor are the offices and a machine shop, and back of this space are the cleaning rooms and the metal storage. The company plans to establish machine shop facilities of considerable capacity some time in the near future, in order that it may do at least a part of the machining of its foundry products.

The foundry floor is of concrete, instead of the usual dirt and sand, giving a smooth surface that makes the work of the molders more efficient, and which is easily kept clean, so that metal which may be spilled or thrown upon it may be reclaimed with little effort. The product is handled economically from the receipt of the raw materials to the loading of the castings for shipment. A spur track from the main line of the New York, New



The Core Ovens



View of the Battery of Aluminum Furnaces

Haven & Hartford Railroad brings the cars of metal to a loading platform, while sand and fuel oil are delivered by gravity to storage compartments beneath a trestle. Traveling cranes minimize the labor of handling heavy flasks and patterns and the castings themselves.

The two departments are kept entirely separate. The furnaces are grouped at the center of the foundry floor, a battery of brass furnaces furnished by the Monarch Engineering & Mfg. Company at one side, and a battery of aluminum furnaces built by the J. D. Smith Foundry Supply Company at the other. All work is kept in its own half of the building, both in the foundry and in the cleaning room, that no accidental alloying may occur to mar the uniformity of the product. The molding machines of the Tabor Mfg. Company are employed for both light and heavy work.

Only a few years ago, in the infancy of this still young industry, aluminum castings were broadly condemned for their poor machining qualities, their low strength, and their ductility. In many cases in which they could be used to advantage in place of iron, or brass, they have not yet been adopted because of a lack of comprehension of the great strides that have been made in the art. Formerly the metal was poured too hot. Now it is known that above 1500 deg. no additional fluidity is obtained, while strength is vitally affected. Another great factor which caused condemnation was alloy troubles. The knowledge of alloys has increased greatly and to-day a great range of physical qualities may be obtained by varying mixtures. Equally important are the advances in mechanical processes of manufacturing castings. Gates are of great size and extend through the lighter parts to the heavy, making it possible to pour at low temperatures and giving uniform shrinking. The use of chills is better understood. Pyrometers regulate the heat for different classes of work. The alloy is usually of either copper or zinc, a small amount of copper being added to the zinc in some cases. The aluminum-zinc alloy has approximately a tensile strength of 30,000 lb. per square inch. However,

it lacks the hardness which would make it suitable for such parts as gears. The automobile manufacturers prefer what is known as No. 12 alloy, which consists of 92 per cent. of aluminum and 8 per cent. of copper, for the greater part of their work. This mixture, while not quite as strong as the zinc alloys, is the safest to cast because it is not subject to cracking.

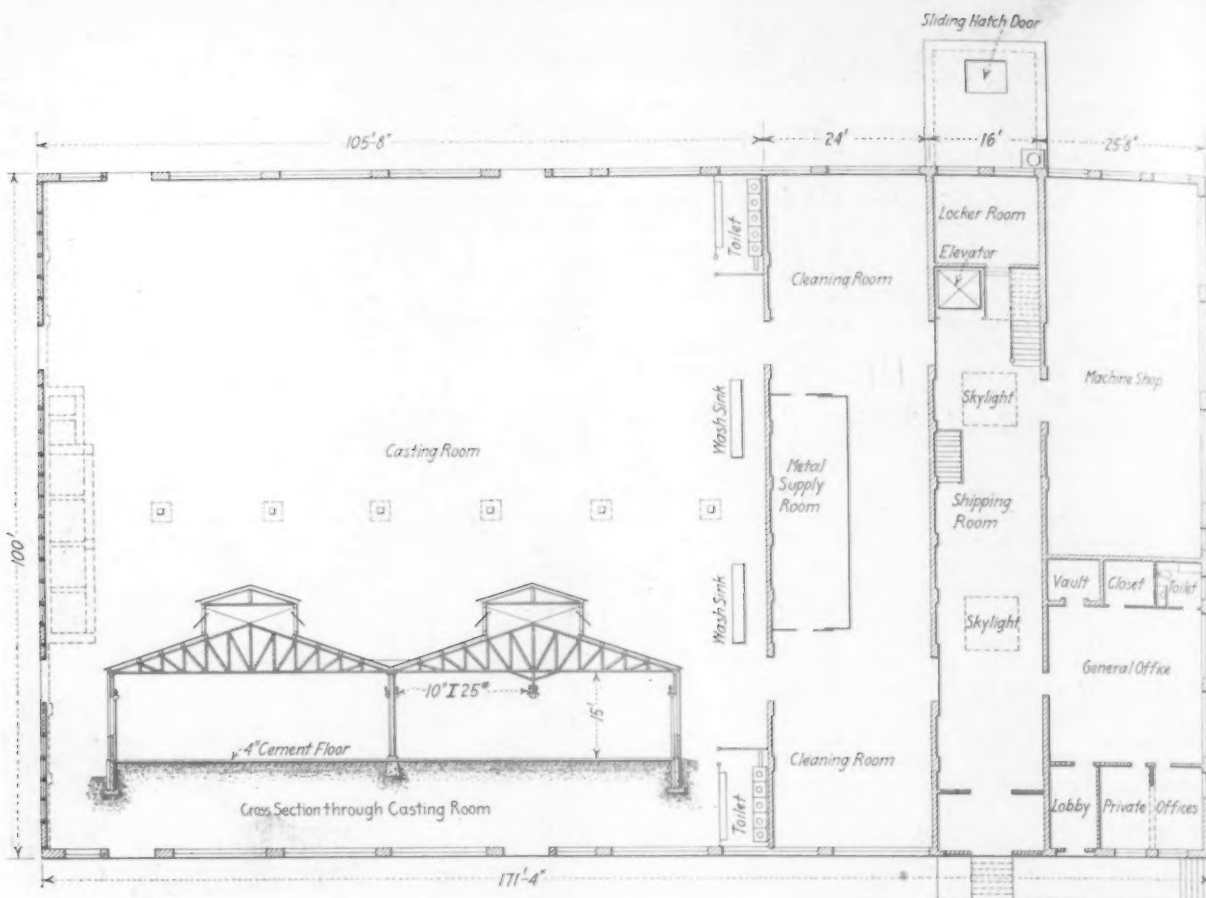
Iron-pot furnaces are used for melting aluminum, and the metal is handled with iron ladles, from which it is poured direct into the molds. A special iron is used for this purpose. It is cheaper and more durable than graphite and the amount of iron taken up by the aluminum is so insignificant that it has no appreciable effect on the strength of the castings. Much care, however, is taken to prevent



A Large Molding Machine



View of the Battery of Brass Furnaces



Plan View of the Foundry and a Cross-Section Through the Casting Room Showing the Suspended Crane Runways

overheating, and in stirring, that iron may not be scraped from the kettle or ladles.

The metal is cast in green sand, which is yielding, permits of free shrinkage, and is also cheaper. The cores must necessarily be soft, and on this account the larger units are not dried clear through, the application of the gas torch being sufficient. The soft interior is yielding and the dry exterior surface prevents blowing when the metal strikes it.

Lake Shipments of Iron Ore in September

The amount of iron ore brought down from the Lake Superior region in September totaled 7,258,413 gross tons as compared with 7,287,230 tons in September, 1912. This is a decrease of 28,817 tons, but though it is the second time a decrease from the previous month has occurred this season, the falling off is only a little over 25 per cent. of what it was in the first case. The following table gives the September and season shipments by ports and the corresponding figures for 1912, all in gross tons:

	September, 1913	September, 1912	To Oct. 1, 1913	To Oct. 1, 1912
Escanaba	673,591	770,974	4,297,223	4,010,985
Marquette	418,242	566,178	2,573,604	2,567,578
Ashland	485,174	757,764	3,558,802	3,623,161
Superior	2,224,553	2,031,086	10,810,391	11,097,276
Duluth	1,938,823	1,652,735	9,830,726	7,729,187
Two Harbors	1,518,030	1,508,493	8,194,738	7,310,195
Total	7,258,413	7,287,230	39,265,484	36,338,382

The total shipments to October show an increase of 2,927,102 tons, or 8.05 per cent., over those for the corresponding period for 1912. The percentage for Duluth to October 1 was 25.04, as compared with 21.27 per cent. last year, while that of the Great Northern Railroad (Superior dock) was 27.53 per cent., as against 30.65 per cent. last year, a decrease of 2.77 per cent.

The large water power of Bombaze Rips, three miles above Norridgewock, Me., on the Kennebeck River, will be developed according to plans of the Bombaze Power Company. A dispatch from Skowhegan, Me., states that the directors of the new corporation are Charles H. Hussey (president), S. C. Wing, William Ayer, William Brackett and Frank W. Spaulding.

The Lake Superior Corporation

At a meeting of Lake Superior Corporation directors, following the stockholders' annual meeting, held in Camden, N. J., October 1, the following officers were elected: W. K. Whigham, chairman of board; J. Frater Taylor, president; Herbert Coppel and W. C. Franz, vice-presidents, and Thomas Gibson, secretary. T. J. Drummond declined re-election as president because of ill health.

Mr. Taylor included the following in his remarks to the stockholders: "Speaking of the Algoma Steel Corporation, the most important subsidiary of the Lake Superior Corporation, not only did we start off with a view of enlarging the blast-furnace end of the plant, not only have we built coke ovens obviating the necessity of importing coke and increased our output of pig iron by 500 tons a day, but we have built more open-hearth furnaces, have put down a most up-to-date power plant second to none on this continent and further, since our meeting here last year, we have put in a new blooming mill and remodeled our rail mills to the extent that we now have 1200 tons of rails per day in sight against 700 tons, and have, of course, in addition, the product of our merchant mills, so that in effect the finished capacity of the plant is twice as great as it was four years ago. All this expenditure has absorbed a great deal of money." He went on to say that outside of transfers from one subsidiary company to another on capital account, a sum of more than \$26,000,000 in cash has been spent in four years in connection with the company's steel plant and railroads.

George S. Capelle and John Richardson, Jr., trustees of the Diamond State Steel Company, 600 Market street, Wilmington, Del., have issued a catalogue of 175 pages enumerating the various parcels of the property of that company on which bids are requested to be made to the trustees prior to October 22. The property, it will be observed, is not offered for sale at public auction. Those who are interested can undoubtedly secure from the trustees copies of the catalogue for the purpose of ascertaining the details of the lots offered and the terms under which bids can be made.

The Foundrymen's Conventions in Chicago

What the Meetings and a Remarkable Combined Exhibition of Equipment for Foundries and Machine Shops Offer This Year

What is expected to prove a memorable week in the technical, mechanical and commercial progress of the foundry industry and that portion of the machinery-using institutions identified to a greater or less degree with the foundry will begin Friday, October 10. On that day will open an exhibition of foundry and machine shop machinery in Chicago which will far outstrip the seven previous exhibitions held under the same auspices. This, like the others, has been scheduled practically simultaneously with the annual meetings of the American Foundrymen's Association, devoted to the scientific and practical in iron and steel casting, the American Institute of Metals, con-

largest permanent exhibition building in the United States. On page 794 is the map of the exhibition hall.

The programmes of the American Foundrymen's Association and the American Institute of Metals have been merged, as will be noted, to give the events by days, and they are of course largely the work of the secretaries of the two societies, Dr. Richard Moldenke, Watchung, N. J., and W. M. Corse, Lumen Bearing Company, Buffalo, N. Y. The general local and entertainment arrangements are in charge of the Chicago Foundrymen's Club, which appointed committees on finance, entertainment, publicity and reception early in June. The personnel of

Programme of Foundry Week

Tuesday, October 14

- 10 a. m.—Joint session of American Foundrymen's Association, American Institute of Metals and the Associated Foundry Foremen.

Addresses of welcome and responses.

Reports of officers of the three associations.

Reports of committees, American Foundrymen's Association.

- 2 p. m.—Joint session:

Address, "Apprenticeship System in the Metal Industries," by M. W. Alexander, Lynn, Mass.

Address, "How to Make a Time Study," by C. E. Knoeppel, New York City.

American Institute of Metals:

Report of Official Chemist, by C. F. Woods.

Report of Bureau of Mines, by Dr. C. L. Parsons.

Report of Bureau of Standards, by G. H. Clamer.

Internal Strains in Bronze Castings, by J. E. Howard.

Work in Metals of the Bureau of Standards, by G. K. Burgess.

Nomenclature of non-ferrous alloys, by G. K. Burgess.

The Brass Foundry of the Future, by C. Powell Karr.

Wednesday, October 15

- 10 a. m.—American Foundrymen's Association:

Gray Iron for Motor Car Castings, by H. B. Swan, Detroit, Mich.

Electric Steel Castings, by F. T. Snyder, Chicago.

Some Difficulties in Pouring Steel Castings, by R. A. Bull, Granite City, Ill.

The Pattern Shop as Related to the Steel Foundry, by E. R. Swanson, Granite City, Ill.

Some Observations on Miniature, or Detachable Open-hearth Furnaces, by W. M. Carr, Erie, Pa.

The Electric Furnace for Steel Castings, by Albert Hiorth, Christiania, Norway.

On the Influence of Changing the Composition of Malleable Cast Iron, by P. Rodigin, Berdiansk (Sea of Azov), Russia.

A Study of the Annealing Process for Malleable Castings, by E. L. Leasman, Boscobel, Wis.

Malleable Troubles, by Dr. Richard Moldenke, Watchung, N. J.

- 10 a. m.—Association Foundry Foremen, annual meeting.

- 12 noon—Luncheon to ladies at Marshall Field & Co.

- 2 p. m.—Complimentary performance to visiting foundrymen at Bismarck Garden.

- 2 p. m.—Theater party for ladies.

Thursday, October 16

- 10 a. m.—American Foundrymen's Association:

The Need of Standard Specifications for Cast Iron, by R. S. MacPherran, West Allis, Wis.

Memoranda on Automobile Cylinder Founding, by Robert Crawford, Detroit, Mich.

Core Test and Specifications, by H. M. Lane, Detroit, Mich.

Testing Molding Sands under Commercial Conditions, by Prof. E. A. Johnson, Boston, Mass.

Vital Points in Foundry Practice, by J. J. Wilson, Detroit, Mich. The Carnegie Institute of Technology, by Dean C. B. Connelley, Pittsburgh, Pa.

"Put Your House in Order," by Frederic A. Parkhurst, M. E., Detroit, Mich.

The Need of a Common Sense Cost System for the Foundry, by E. W. Riker, New York City.

- 10 a. m.—American Institute of Metals:

Efficiency Engineering in the Foundry, by E. A. Barnes.

Scientific Management, by W. M. Corse.

Scientific Management, by F. A. Parkhurst.

How Scientific Management Works in Our Plant, by C. B. Bohn.

Core Room Economics, by O. F. Flumerfelt.

Boiling of Metals, by Dr. J. W. Richards.

- 2 p. m.—American Foundrymen's Association:

Iron, Where Does It All Go To? by D. C. Wilson, Newark, N. J.

On the Relative Value of Foundry Flour, with Simple Methods of Testing, by G. S. Evans, Lenoir City, Tenn.

Memoranda on Accident Prevention, by Thos. D. West, Cleveland.

The Use of Powdered Coal as Fuel, by W. S. Quigley, New York City.

Memorandum on the Centrifugal Blower for the Foundry, by Dr. Richard Moldenke, Watchung, N. J.

Oxy-acetylene Welding and Cutting, by W. S. Hoyt, Chicago, illustrated by lantern slides.

Unfinished and new business, election of officers, etc.

- 7 p. m.—Annual subscription banquet at the La Salle Hotel.

Friday, October 17

- 10 a. m.—American Institute of Metals:

Producer Gas for Brass Melting, by E. F. Bulmahn.

Commercial Operation of the Hering Furnace, by G. H. Clamer.

Silver Plating and Spotting Out, by C. F. Burgess.

Fluxes for Soft Solders, by W. Arthur.

Aluminum Solders, by W. Arthur.

Approximate Melting Points of Some Commercial Alloys, by A. B. Norton and H. W. Gillett.

cerning itself with non-ferrous metals, and the Associated Foundry Foremen, an organization for mutual uplift. For the benefit of those planning to participate, advance information concerning the programmes of the two professional societies has been obtained and to give some idea of the scope of the exhibition as well as an outline of what may be seen, a map of the exhibition hall is here reproduced, accompanied by an alphabetical listing of exhibitors, with a brief statement of the scope of each exhibit, of the names of representatives and, in connection with the map, of the location of the exhibits. The meetings of the associations will be held in the La Salle Hotel, Chicago, beginning with registration on Monday, October 13, while the exhibition will continue through October 17, housed in the International Amphitheater Building, at Forty-second and South Halsted streets, a structure said to be the

the members of the Chicago general committee, which is constituted of the heads of the sub-committees, is touched on briefly on page 791, which contains copies of their portraits.

As regards the exhibition, this will be conspicuous for the large representation of builders of metal working machines. It will be noteworthy, also, for its large size and total number of exhibitors. The accompanying lists show over 175 exhibitors against 108 last year, and the exhibition space totals 75,000 sq. ft. against 30,000 used last year. The exhibition is all on one level and it is estimated that nearly 90 per cent. of those exhibiting will require power. It will be surprising if it does not duplicate recent years' experiences with the exhibitions in proving them to be market places for buyer and seller of no mean magnitude.

Exhibitors and the Products Displayed

- Acme Machine Tool Company, Cincinnati, Ohio—Cincinnati Acme 18-in. universal geared head turret lathe and a combination flat turret lathe which is a new addition to the company's line.
- Ajax Metal Company, Philadelphia, Pa.—Ingot metals, including Ajax bronze, manganese bronze, phosphor bronze, acid bronze, hydraulic bronze, steam metal, red and yellow brass; Ajax phosphor copper, manganese copper and silicon copper, Bull babbit metal and genuine babbit metal, etc. Represented by H. D. Carpenter, G. H. Clamer, W. J. Coane and C. F. Hopkins.
- Albany Sand & Supply Company, Albany, N. Y.—Range made in Albany stove plate sand by the Walker & Pratt Mfg. Company, Boston, Mass.; also barebelt dressing. Represented by Arthur T. Palmer, Charles H. Bird and S. Marshall.
- American Steam Pump Company, Battle Creek, Mich.—Pumps and air compressors of the Marsh and American types with special stress laid on American track and flywheel air compressors in both the steam and power driven types. Represented by S. C. Byce, George Clucas, J. M. Stannard and Howard Baker.
- American Tool Works Company, Cincinnati, Ohio—In connection with the Essley Machinery Company will show 5-ft. American radial drill, motor-driven; 20-in. x 10-ft. American geared head lathe, motor-driven; 2-ft. American radial drills, belt-driven; 15-in. American shaper, belt driven. Represented by C. K. Cairns and J. C. Hussey.
- Arcade Mfg. Company, Freeport, Ill.—Recent developments in the molding machine line, jolting and squeezing machines, core machines and a demonstration of the company's match plate process. Thirty types of molding machines will be shown. Represented by E. H. Morgan, Charles Morgan, L. L. Munn, F. N. Perkins, August Christen, G. D. Wolfley, W. C. Norcross, R. E. Turnbull, Henry Tscherning, F. E. Boedeker, B. C. Trueblood and Reeve Burton.
- E. C. Atkins & Co., Indianapolis, Ind.—Metal cutting saws and specialties of interest to the foundry and machine trades; Atkins Kwik Kut high speed power hack saw in operation.
- Automatic Transportation Company, Buffalo, N. Y.—Electric freight and industrial trucks with charging rheostats for same. Represented by L. J. Goodsell and the Donahue Steel Products Company, Chicago.
- Ayer & Lord Tie Company, Chicago, Ill.—Sample pavement of interior wood blocks, also blocks that have been taken from floors that have been in service various lengths of time, similar blocks from street pavement, etc. Represented by Frank Weaver and A. H. Noyes.
- Jonathan Bartley Crucible Company, Trenton, N. J.—Crucibles, retorts, etc. Represented by S. H. Dougherty, Lee T. Ward, H. D. Cole and Lewis H. Lawton.
- Barnes Drill Company, Rockford, Ill.—Will show in connection with the Essley Machinery Company exhibit their all-geared drills, including a 20-in. all-geared drill with motor drive in operation and a 26-in. sliding head all geared drilling and tapping machine with motor drive in operation. Represented by A. M. Johnson, B. F. Barnes and J. E. Andress.
- Barton Tool & Supply Company, Chicago, Ill.—Stowe Mfg. Company's products, Pittsburgh Pneumatic Company's air drill, riveters and hammers and new safety lathe dog made by the Oneida National Chuck Company.
- Battle Creek Sand Sifter Company, Battle Creek, Mich.—Standard Simplex and Duplex foundry sand sifters.
- Benjamin Electric Mfg. Company, Chicago, Ill.—Punch press safety devices and a line of industrial electric light fixtures. Represented by William Cottrell, H. E. Watson, G. B. Weber and A. L. Lubeck.
- Bennett-O'Connell Company, Chicago, Ill.—Complete operating plant for mechanical plating and material used in plating and polishing. Represented by M. J. O'Connell, C. D. Bennett, S. E. Huenerfauth and Mr. Schult.
- Berkshire Mfg. Company, Cleveland, Ohio—New core machine, also hand and power squeezer molding machines, air compressors, vibrators, flasks, etc., on some of which are improvements new to the trade.
- Charles H. Besly & Co., Chicago, Ill.—Belt and motor-driven disk grinders, double spindle disk grinder, horizontal disk grinder, motor-driven pattern makers' disk grinder, all running under power; also Helmet spiral circles, temper taps, oil and Boxite circles. Represented by Edward P. Welles, Charles A. Knill and others.
- S. Birkenstein & Sons, Chicago, Ill.—Metal for brass and aluminum foundries. Represented by H. Birkenstein, H. Brown and L. Kahn.
- Blake & Knowles Steam Pump Works, East Cambridge, Mass.—Improved type of core wire straightening machines, which are to be a part of the S. Obermayer Company exhibit.
- Blystone Machinery Company, Cambridge Springs, Pa.—Core sand and facing mixer with rotary screen attached. Represented by W. E. Wright, Luther G. Conroe and Walter J. Pees.
- Brown Specialty Company, Chicago, Ill.—Hammer core machines in operation; also cutting-off and tapering machines. Represented by Elmer A. Rich, Jr., and John Laycock.
- A. Buch's Sons Company, Elizabethtown, Pa.—Hand and electrically operated jar and squeeze molding machines, sample castings made on gravity and jar and squeeze machines, cast-iron floor flasks, tapered aluminum snap flasks, cast-iron bottom plates, cast-iron casings, cast-iron pattern frames, cast-iron pattern plates, treated wood pattern boards, adjustable steel slip flask bars, pattern mountings, etc. Also drawings, photographs and catalogues describing a gravity molding machine. Represented by R. S. Buch, W. W. Birnstock, D. C. Coble, H. J. Felsburg, J. E. Buch, J. L. Nute, H. J. Moore, E. P. Pitfield and A. G. Item.
- Buckeye Products Company, Cincinnati, Ohio—Represented by C. J. Goehring, C. S. Weigert, R. B. Ferguson, E. O. Stamm and J. B. Carpenter.
- Bullard Machine Tool Company, Bridgeport, Conn.—New Era type, 36-in. vertical turret lathe equipped with a cutting lubricant system. In this machine cast iron has been eliminated as a material for gearing and for it has been substituted heat-treated alloy steel which can withstand the strain imposed by modern cutting requirements. The lubrication has been given especial consideration.
- Carborundum Company, Niagara Falls, N. Y.—Carborundum and Aloxit wheels, Carborundum rubbing bricks, paper and cloth disks for foundry use. Represented by George R. Rayner, C. C. Schumaker, O. C. Dobson, R. H. Kerwin, C. D. Bradbury and J. H. Jackson.
- Carter Metals Cleaning Company, Philadelphia—A sand blast machine for cleaning castings in operation.
- Cataract Refining & Mfg. Company, Buffalo, N. Y.—Bison core oils and cutting compounds. Represented by R. J. Collins, F. E. Hill, E. P. Hughes and D. L. Baldwin.
- Chicago Pneumatic Tool Company, Chicago, Ill.—Pneumatic machines, including drills, grinders, rammers, sand sifters and hoists. Represented by E. Aplin, C. H. Schumacher, A. E. Conrow, A. C. Andresen, G. W. Parker, J. G. Osgood, W. C. Walker, C. Humphrey.
- Cincinnati Bickford Tool Company, Cincinnati, Ohio—One 24-in. high-speed shaft-driven upright drill with motor in gear box, one 4-ft. regular plain radial drill with variable speed motor drive. Represented by S. C. Schauer, H. M. Norris, Lee Schauer, John Herking and others.
- Cincinnati Milling Machine Company, Cincinnati, Ohio—In connection with the exhibit of the Marshall & Huschart Machinery Company will show in operation a vertical milling machine, motor-driven by belt; a universal high-power milling machine with regular equipment, and a grinder sharpening the various styles, sizes and forms of milling cutters for which it is designed. Represented by John G. Klaiber.
- Cincinnati Planer Company, Cincinnati, Ohio—New style heavy pattern planer equipped with reversible motor drive of the Triumph-Monitor make, which eliminates pulleys, belts and overhead mechanism. Represented by Charles Meiers and B. B. Quillen.
- Cincinnati Pulley Machinery Company, Cincinnati, Ohio—Avey ball bearing drilling machines in various sizes. Represented by J. G. Hey and the Essley Machinery Company.
- Charles J. Clark, Chicago, Ill.—Operating exhibit of the Clark blast meter for measuring the volume of cupola blast; meters of various capacities, etc. Represented by Charles J. Clark.
- Cleveland Pneumatic Tool Company, Cleveland, Ohio—Riveting hammers, chipping hammers, sand rammers for bench, core and flask ramming; air drills, portable emery grinders and other pneumatic tools for foundry and shop use. Represented by H. S. Covey, C. J. Albert and Arthur Scott.
- Cleveland Wire Spring Company, Cleveland, Ohio—Steel shop and foundry barrels, shop boxes, core trays, factory shelving, coiled wire springs, etc. Represented by J. W. Campbell, J. B. Marshall and A. S. Chave.
- Clipper Belt Lacer Company, Grand Rapids, Mich.—Clipper belt lacers and supplies. Represented by W. K. Lee.
- Thomas E. Coale Lumber Company, Philadelphia, Pa.—Lumber used in the making of patterns and flasks, including samples of mahogany, redwood, spruce and white pine. Represented by Thomas E. Coale and E. C. Anderson.
- Cowan Truck Company, Holyoke, Mass.—New type of transveyor which will lift a loaded platform 3 in., making passage over rough floors and inclines easy. Represented by E. J. Smith and F. B. Hopkins.
- Crawford Oil & Chemical Company, Cleveland—Core oils, match oil, waterproofing oil and black paint. Represented by George F. Burman, Warner G. Smith and P. S. Crawford.
- Curtis Pneumatic Machinery Company, St. Louis, Mo.—Overhead traveling crane, overhead trolley system, Curtis foundry hoist, sand blast and two air compressors, one of which will be in operation. Represented by E. J. Clark and L. C. Blake.
- Davenport Machine & Foundry Company, Davenport, Iowa—Portable straight leg power squeezer, portable sand straddling power squeezer, stationary power squeezer, jolt rammer power squeezer which is shown for the first time, plain jolt machine, portable hand ram roll over machines, portable jolt rock over pattern draw machine, also match plate vibrators. Represented by J. T. Anderson, H. Gallagher and A. J. Goss.
- Davis-Bournonville Company, Jersey City, N. J.—Acetylene generators, compressed acetylene cylinders, oxygen cylinders with welding and cutting torches and pressure gauges and regulators; also the oxygraph for cutting steel according to pattern. Represented by W. S. Schoenthaler.
- De La Vergne Machine Company (Mott Sand Blast Department), New York—Sand-blast room, the main feature of which is an air chamber designed to permit sand blasting and still keep the room practically free from dust; also self-contained sand-blast barrel in operation. Represented by David Mayer, E. J. Rosenthal and George D. Fletcher.

- Diamond Machine Company, Providence, R. I.—Will show as a part of the E. L. Essley Machinery Company's exhibit its disk-grinding machine No. 6X with sliding table and ring wheel chuck on right-hand side and semi-universal table and 18-in. disk on left-hand side.
- Dings Electro-Magnetic Separator Company, Milwaukee, Wis.—Separators suitable for use in brass foundries and metal-refining plants; also separators for recovering iron from refuse in steel, malleable and gray iron plants. Represented by M. Dings and R. A. Manegold.
- Joseph Dixon Crucible Company, Chicago, Ill.—Crucibles, stoppers, nozzles, sleeves and miscellaneous graphite products. Represented by D. A. Johnson, W. B. Allen, F. R. Brandon, H. C. Sorenson, A. L. Haasis, Malcolm McNaughton, Frank Krug and L. M. Chase.
- Stanley Doggett, New York—Parting compounds, iron cement, dry core compound, metal workers' soapstone crayons and pencils and soapstone facings. Represented by Stanley Doggett and H. A. Roffmann.
- Duplex Shaker Works, Chicago—Motor and air-driven sand shakers in operation. Represented by I. E. Burtis, James Scully and M. K. Ross.
- Emmert Mfg. Company, Waynesboro, Pa.—Universal wood workers' and metal workers' vises. Represented by S. Obermayer & Co., Chicago.
- E. L. Essley Machinery Company, Chicago, Ill.—A number of machine tools in operation, including some manufactured by the following, who also will have their representatives on the ground: American Tool Works Company, represented by C. K. Cairns; Cincinnati Pulley Machinery Company, represented by L. B. Patterson and J. G. Hey; Diamond Machine Company; Kemp-smith Mfg. Company, represented by F. Wollaeger and Charles Drewes; International Machine Tool Company, represented by L. A. Dolton and R. H. Bradford; Barnes Drill Company, represented by B. F. Barnes, J. C. Andress and A. M. Johnson; Springfield Machine Tool Company, represented by E. S. Montanus. Representing the Essley Machinery Company will be E. L. Essley, J. R. McDonald, H. F. Roberts, C. M. Robertson, George Burki and J. J. Shanahan.
- Federal Foundry Supply Company, Cleveland, Ohio—Core jarring machine with the clamping device on the table, complete core jarring unit consisting of an air compressor, receiving tank and core jarring machine all in operation. Also plain molding machine and the company's latest jolt roll over and direct draw machine, etc. Represented by W. J. Adams, R. Ditty, J. Bayer, E. Kaye, L. H. Heyl and C. A. Collins.
- Felt & Tarrant Mfg. Company, Chicago, Ill.—Demonstration of the new controlled-key duplex Comptometer adding and calculating machine as applied to book work, billing, estimating, prorating, cost calculations, etc. Represented by R. E. Bell and others.
- Garden City Sand Company, Chicago, Ill.—Samples of molding, core and furnace sands, cupola blocks, fire brick, fire clay, sand-blasting sand, waterproofing compounds and Stonekote. Represented by C. C. McNeal and William Chambers.
- Gardner Governor Company, Quincy, Ill.—Vertical and horizontal inclosed types of air compressors. Represented by J. W. Wall, William B. Frey, R. A. Kiefer, M. D. Cheesman, E. M. Loeffler, M. W. Maloney and Laurence Bremser.
- Gardner Machine Company, Beloit, Wis.—Represented by F. E. Gardner, L. W. Thompson, W. B. Leishman, E. B. Gardner, J. M. Gardner and E. L. Beisel.
- General Electric Company, Schenectady, N. Y.—Two centrifugal compressors, one a 30-hp. induction motor-driven machine for 4500 cu. ft. free air delivered per min. at 16 oz. pressure, and another a 20-hp. Curtis turbine-driven machine for 3200 cu. ft. free air delivered per min. against 16 oz. pressure.
- Gill Clay Pot Company, Muncie, Ind.—Fire clay products such as brass furnace linings, caps, stools, cupola blocks, etc. Represented by Charles O. Grafton and John H. Hill.
- Gisholt Machine Company, Madison, Wis.—Gisholt Periodigraph: electrically controlled apparatus for keeping workmen's time and determining the cost of operations. Represented by H. B. McCabe and J. E. Ruth.
- Globe Steel Company, Mansfield, Ohio—Chilled shot or iron sand for use in place of sand blast; also gray iron, malleable iron and steel castings, forgings and aluminum pieces cleaned with shot. The company's shot will be used at the exposition by the Pangborn Corporation and the Mott Sand Mfg. Company. Represented by E. K. Bacon.
- Goldschmidt Thermit Company, New York—Various metals free from carbon. Thermit cans for reviving dull iron in the ladle and illustration of the use of Thermit for repairing large rolls and pinions and for preventing piping in steel ingots; an exhibit of specimen welds in such sections as crank shafts, gear wheels, locomotive frames, etc., also the welding of small defects such as blow holes in castings.
- Gondale Company, Kalamazoo, Mich.—Complete stoves, every casting of which was made from matchplates made by the company; floor plates, hinged and fitted with flasks, machine or bench plates with flasks, castings made with matchplates and a new roll-up matchplate hinge, as well as other improvements. Represented by W. C. Bogenschütz and H. C. Howard.
- Gould & Eberhardt, Newark, N. J.—With its representatives, the Marshall & Hushart Company, this company will exhibit one of its gear-hobbing machines and a new shaper with motor drive, automatic starter and dynamic brake and control. The hobbing machine will be in operation cutting sprocket gears and driven by a Westinghouse motor, direct-connected with automatic push-button control. Represented by F. L. Eberhardt.
- Greaves, Klusman & Co., Cincinnati, Ohio—One 17-in. x 8-ft geared-head single-pulley-drive lathe with belted motor drive of new design, and one 15-in. x 6-ft. heavy standard engine lathe with direct-connected motor drive which has a speed-controlling device containing new features. Represented by W. A. Greaves.
- Great Western Mfg. Company, Leavenworth, Kansas—Two types of the Combs' gyratory riddle, one electrically driven and the other air driven. Represented by George W. Combs and F. A. Pickett.
- Great Western Smelting & Refining Company, Chicago, Ill.—Ingot brasses of various compositions, polished and unpolished, to show the color of castings which may be made from them, also various castings, babbitt metals and other products. Represented by J. Collin, A. L. Levy, Arthur Lewis, J. B. Neiman and I. N. Perlstein and Samuel Spiro.
- Hannifin Mfg. Company, Chicago, Ill.—Air operated chucks, planting devices, mandrels, fire door operators and small tool labor saving shop equipment. Represented by M. J. Hannifin, H. A. Schultz, A. V. Hannifin, J. R. Stone and L. M. White.
- Hayward Company, New York—Electrically operated clam-shell bucket of new design for handling foundry sand and other materials; also orange-peel buckets, drag scraper buckets, etc. Represented by H. S. Atkinson, H. M. Davison and C. S. Sargent.
- Herman Pneumatic Machine Company, Zelienople, Pa.—Two new designs of machines, one an independent jar ram roll over machine which uses one cylinder to roll the mold over after it is jarred and an independent cylinder for the drawing of the pattern. The other will be a jar ram hand pattern-stripping machine designed for small, but deep flasks. Represented by A. M. Fraunheim, M. L. Heyl, A. Rogers, L. R. Palmer, R. F. Ringle and R. M. Porteous.
- Hill & Griffith Company, Cincinnati, Ohio—Peerless perforated and Haskins patent ventilated chaplets and foundry specialties. Represented by D. T. Richards, William Oberhelman, F. W. Weissmann, J. H. Lyle, F. McCarthy, G. H. Kersting and J. A. Carey.
- Hill-Brunner Foundry Supply Company, Cincinnati, Ohio—Represented by John Hill and M. Z. Fox.
- Hoebel Sandblast Machine Company, New York—Revolving barrel and rotary table sandblast machines. Same representatives as Wiener Machinery Company.
- Hoskins Mfg. Company, Detroit, Mich.—Working demonstration of hardening of carbon and high-speed steels with Hoskins electric furnaces, also pyrometers, heating appliances, International Ammeters, voltmeters and miscellaneous products. Represented by W. D. Little, C. F. Busse and A. B. Tilton.
- Hunter Saw & Machine Company, Pittsburgh, Pa.—Grinder for grinding teeth of Hunter Duplex inserted tooth saws, saw grinder and beveling machine, several Hunter Duplex tooth saws, saw for cutting hot tubes, saw for cutting ingots and forgings hot, high-speed friction saw (Vanadium steel) for cutting rails, etc., and saws suitable for various makes of cold saw machines.
- Ideal Furnace Company, Chester, Pa.—Ideal tilting crucible furnace. Represented by P. J. Sweeney.
- Independent Pneumatic Tool Company, Chicago, Ill.—Thor single-valve pneumatic chipping, calking and flue-heading hammer, which has a new valve mechanism and is suitable for steel foundry and general foundry service; Thor pneumatic sand rammer and Thor electric drill; also Thor one-piece long-stroke riveting hammers, close-quarter piston air drills, wood-boring machines and pneumatic grinders. Represented by J. D. Hurley, R. T. Scott, G. C. Wilson, B. A. Durbin, Fred J. Passino, W. R. Gummere, F. H. Charbono and W. A. Johnson.
- Ingersoll-Rand Company, New York—Extensive line of pneumatic tools for foundry use such as sand rammers, pneumatic chipping hammers, piston drills, motor hoists and stationary motors, also riveting hammers of the latest construction. In addition there will be in operation two air compressors, one a 14-in. stroke, type XB-2 Duplex compressor, driven by an electric motor, short-belt drive, for supplying air at 100 lb. pressure, and the other a 12-in. stroke, NE 1, straight-line compressor, driven by an electric motor, short-belt drive, for supplying air at 50-lb. pressure to be used for sand blast machines, blowers. The air is for the use of exhibitors. Represented by W. H. Armstrong, W. A. Armstrong, James Moran, J. L. Kelly, L. J. David, James P. Gillies, Grover C. Luckner and J. D. Rathbun.
- International Machine Tool Company, Indianapolis, Ind.—Will display as a part of the Essley Machinery Company an 18-in. Libby heavy-duty turret lathe which has several new features. It will be tooled up for finishing forged spur-gear blanks 8½ in. in diameter and will be in operation on this work. Represented by L. A. Dolton and R. H. Bradford.
- International Molding Machine Company, Chicago, Ill.—Various types of power squeezers of light, medium and heavy construction, stripping plate machines for small, large and heavy work, jarring machines operated by air and electricity and a special machine for making cores, hand turn over draw machines, power turnover, power draft machine and several combination machines. Represented by Edward A. Fridmore, W. W. Miller, D. C. Snow, J. W. Dopp and E. H. Schwartz.



L. W. Olson



F. N. Perkins



W. M. Corse

Officers of the Foundrymen's Associations



H. D. Miles

Mr. Miles, Buffalo Foundry & Machine Company, Buffalo, N. Y., is president of the American Foundrymen's Association. Dr. Moldenke, Watchung, N. J., is secretary.

Mr. Olson, Ohio Brass Company, Mansfield, Ohio, is president of the American Institute of Metals.

Mr. Corse, Lumen Bearing Company, Buffalo, is secretary.

Mr. Perkins, Arcade Mfg. Company, Freeport, Ill., is president of the Foundry & Machine Exhibition Company.

Mr. Hoyt, Lewis Institute, Chicago, is secretary.

Mr. Thompson, Buffalo Pitts Company, Buffalo, N. Y., is secretary-treasurer of the Associated Foundry Foremen.



Dr. R. Moldenke



C. E. Hoyt



R. B. Thompson



David R. Forgan



William Francis



C. B. Carter

Chairmen of the Convention Committees



C. A. Plamondon

Mr. Plamondon, president A. Plamondon Mfg. Company, is chairman of the general committee.

Mr. Forgan, president National City Bank, Chicago, is treasurer of the general committee.

Mr. Estep, associate editor, The Foundry, is secretary of the general committee.

Mr. Galligan, Pickands, Brown & Co., is chairman of the finance committee.

Mr. Carter, American Brake Shoe & Foundry Company, is chairman of the entertainment committee.

Mr. Abell, Western editor *The Iron Age*, is chairman of the publicity committee.

Mr. Francis, president Francis & Nygren, Chicago, is chairman of the reception committee.



J. A. Galligan



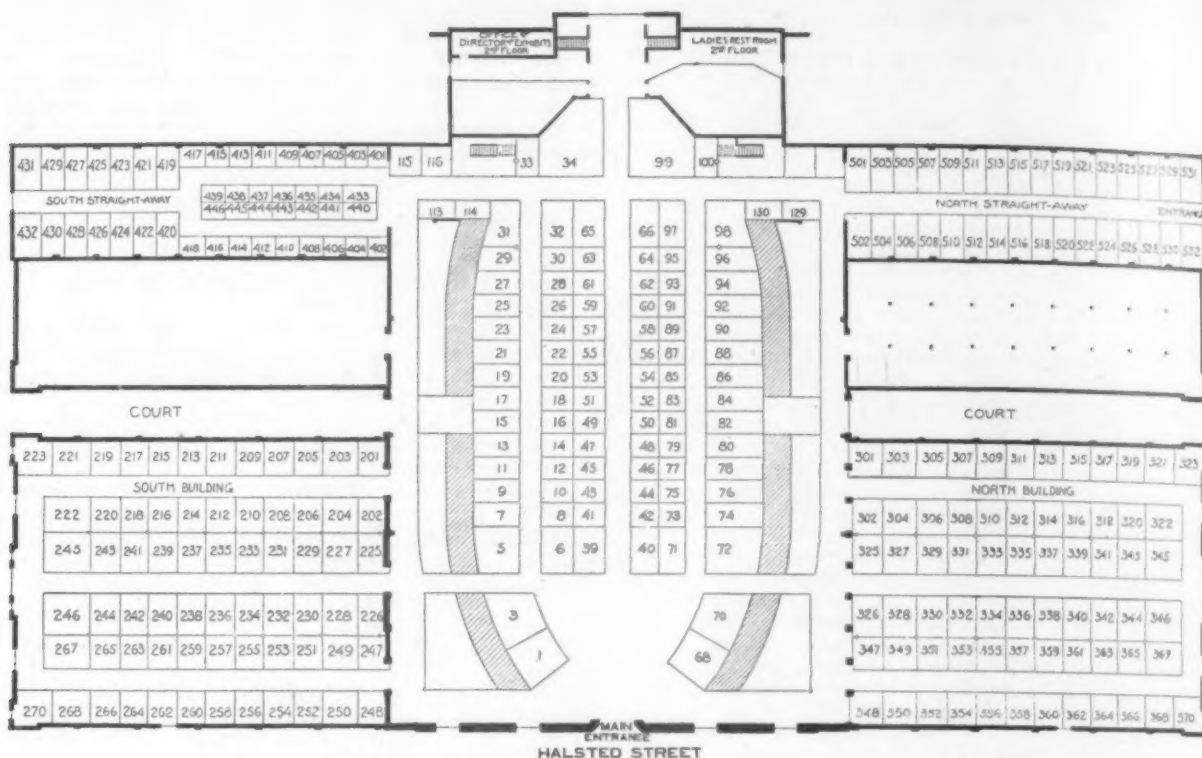
H. Cole Estep



Oliver J. Abell

- Interstate Sand Company, Zanesville, Ohio.—Molding sands and clays. Represented by F. L. Moore.
- Jennison-Wright Company, Toledo, Ohio.—Kreolite block floor construction and its adaptation to various uses. Represented by F. E. Jennison and F. M. Enwright.
- Charles C. Kavin Company, Chicago, Ill.—Chemists and metallurgists. Represented by Charles C. Kavin, J. F. Mellis, R. J. Courtney, William J. Mulcahy and J. H. Hopp.
- T. P. Kelly & Co., New York.—Foundry supplies. Represented by E. R. Wolverton.
- Kemp Smith Mfg. Company, Milwaukee, Wis.—Universal milling machine, new Kemp Smith No. 33 Lincoln type milling machine, motor-driven and in operation. Milling operations will be such as to demonstrate strength and capacity.
- Julius King Optical Company, Chicago, Ill.—Safety goggles for protection of the eyes of workmen employed in foundries and kindred trades. Represented by J. T. Brayton and J. J. Luthy.
- Knickerbocker Company, Jackson, Mich.—Morse rarified dust collector for use in connection with emery wheels, sand blast, tumbling barrels, etc. Represented by W. B. Knickerbocker.
- Landis Machine Company, Waynesboro, Pa.—One 1½-in. double-head bolt cutter, motor-driven; one 2-in. four-chaser stationary pipe die head; one 8-in. six-chaser stationary pipe die head; one ½-in. automatic screw-cutting die head; one 1¼-in. automatic screw-cutting die head; one 1-in. solid adjustable die head. The 4 and 8-in. six-chaser pipe die heads are new. Represented by Faber W. Heefner and Carl F. Meyer.
- H. M. Lane Company, Detroit, Mich.—Photographs of the company's work. Represented by H. M. Lane, O. F. Flumerfelt, P. L. Keachie and T. A. Leyshon.
- La Salle Machine & Tool Company, La Salle, Ill.—In connection with the Marshall & Hushart Machinery Company will be shown a No. 1 plain and surface grinder of this company's make. Represented by F. W. Mattheissen, Jr., and S. M. Trenary.
- Lehon Company, Chicago, Ill.—Mule hide roofing, insulating paper, waterproof cloth, fireproof cloth, waterproof coal bags, saturated burlap and waterproof wagon and horse covers. Represented by Thomas Lehon and D. B. Wright.
- Lodge & Shipley Machine Tool Company, Cincinnati, Ohio.—One 16-in. x 6-ft. universal new model tool room lathe with selective head, pan, universal relieving attachment, universal taper attachment, automatic chasing stop, draw-in chuck with collets, step chuck with closer, driven by individual motor mounted on bracket at back of the lathe; also one 18-in. x 8-ft. selective head engine lathe with multiple stops to length and cross feeds, connected compound and plain rests, four-way tool block, pan, pump and tubing, driven by individual motor mounted inside the head leg.
- David Lupton's Sons Company, Philadelphia, Pa.—Lupton steel sash, Pond continuous sash, Pond operating device, Lupton rolled steel skylight, all with special attention to the requirements of foundries and forge shops; drawings showing the Pond truss for buildings and photographs of Lupton installations. Represented by Clarke P. Pond and R. A. Sanborn.
- Macleod Company, Cincinnati, Ohio.—One 4000-lb. capacity Buckeye sand blast, sand separator, oil burners for cupola lighting, oil burners for skin drying molds and oxy-acetylene plant for welding and cutting. Represented by Walter Macleod, J. W. Mooney and Fred Neumann.
- Manufacturers' Equipment Company, Chicago, Ill.—Aero chucks and collapsible taps. Represented by Paul J. Grebel and Charles George.
- Marshall & Hushart Machinery Company, Chicago, Ill.—Will represent and display machines manufactured by the following companies who will be represented by the persons named: Acme Machine Tool Company, represented by Robert Endebrock; Bullard Machine Tool Company, represented by Stanley H. Bullard, J. W. Bray and F. B. Smith; Cincinnati Milling Machine Company, represented by J. G. Klaiber; Cincinnati Bickford Tool Company, represented by August Tuechter, A. B. Gradolf, S. C. Schauer and H. N. Norris; Lodge & Shipley Machine Tool Company, represented by J. W. Carrol and N. D. Chard, Sr.; Rockford Drilling Machine Company, represented by S. H. Reck and J. F. Langwell; Cincinnati Planer Company, represented by B. B. Quillen and Charles Meiers; Baker Brothers, represented by Arthur Baker and George Hollenbeck; Gould & Eberhardt, represented by Fred L. Eberhardt and Mr. Kellar; Greaves-Klusman Company, represented by W. A. Greaves; Landis Machine Company, represented by J. G. Benedict, C. F. Meiers and S. W. Hoefner; Willard Machine Tool Company, represented by G. A. Willard and Percy Willard; LaSalle Machine Tool Company, represented by Mr. Gearney and E. O. Partridge.
- Midland Machine Company, Detroit, Mich.—Grimes jar rammed roll over pattern draw molding machine, hand ram roll over machine and a stripping plate machine. Represented by G. L. Grimes and Charles Skeffington.
- Monarch Engineering & Mfg. Company, Baltimore, Md.—Tilting iron-pot furnaces for soft metals, tilting foundry coke furnaces, tilting oil furnaces, tilting gas furnaces, stationary oil or gas drop-bottom pit furnaces, stationary oil or gas foundry furnaces, portable car type of large tilting furnaces for melting of rolling mill metals or ores, etc., at the mines; combination triple shop furnaces for tool room, combination 8 in 1 furnaces for tool room, Rockwell type; oil rivet forge, Rockwell type; blacksmith and forge furnace, ladle heater, Rockwell type; core oven, Reading model, coke; core oven, Acme model, oil; core oven, Junior model, gas; core oven, door type; assorted lead-hardening and melting furnaces, etc. Represented by J. J. Allen, M. W. Woodburn, J. H. Fowler and H. D. Harvey.
- J. S. McCormick Company, Pittsburgh, Pa.—Facing and core-sand mixer, Murphy pistol sprayer, Vulcan and Ajax blacking and general foundry supplies. Represented by J. S. McCormick, T. E. Malone and S. R. Costley.
- McLain's System, Milwaukee, Wis.—Semi-steel castings of light section, such as automobile cylinders, containing 30 per cent. steel, and other light parts, test bars, etc. Represented by David McLain, I. V. Scanlan, Harry McLain and C. W. Miller.
- New Haven Sand-Blast Company, New Haven, Conn.—New Haven sel.-contained sandblast rolling barrel; also new type of hose sandblast machine with dust collector, etc. Represented by Charles A. Dreisbach, C. H. Johnson and E. H. Mansfield.
- Norma Company of America, New York—Norma anti-friction bearings and Hirth minimeters for precision measurements, including thrust bearings in both single and double types with a variety of housings; also bearings representing unit combinations of standard annular roller and thrust bearings. The Hirth minimeter is a German instrument.
- Norton Company, Worcester, Mass.—Grinding demonstrations on swing frame grinding machine, flexible shaft grinding machine, new model 2-in. Norton floor stand, new model ¾-in. Norton bench stand, also exhibit of Alundum and Crystolon grinding wheels and a Hoskins furnace in operation to illustrate Alundum muffles and pyrometer tubes. Represented by E. W. Dodge, Carl F. Dietz, John Horne, C. E. Gillette and R. G. Williams.
- S. Obermayer Company, Chicago, Ill.—Extensive line of foundry equipment and supplies, including brass foundry tumbler, core ovens, sprue cutters, molding troughs and benches and core venting machines; also a positive pressure blower, core wire straightening machine, pattern makers' vises, lighting torches; emery grinders, fire brick and cupola blocks. Represented by S. T. Johnson, Theodore Kauffmann, C. M. Barker, F. H. Dodge, J. E. Evans, W. H. Fitzpatrick, J. J. McDevitt, O. C. Olsen, O. J. Peterson, A. N. Wallin, G. P. Peterson and C. H. Green.
- Ohio Fire Brick Company, Oak Hill, Ohio—Fire brick as a part of the Obermayer Company's exhibit.
- Ohio Sand Company, Conneaut, Ohio—Samples of molding sand. Represented by F. E. Gordon and Hugh E. Kanavel.
- Oliver Machinery Company, Grand Rapids, Mich.—Special patternmakers' machines, including latest type of universal wood-milling machine, universal saw bench, combination disk and spindle sander, band saw, jointer, oil stone grinder, all in operation; also patternmakers' gap lathes, speed lathes, boring machines and a full line of filing and grinding room equipment. The heaviest machine shown will weigh 15,000 lb. and the entire exhibit about 30 tons. Represented by G. F. Reinhard, W. Y. Mentzer, Arthur Blake, A. S. Kurkjian, J. C. Whitney, M. D. Baldwin and V. M. Tuthill.
- Oshorn Mfg. Company, Cleveland, Ohio.—Plain jolt machines, direct draw roll over jolts, drop plate and stripping plate machines, air squeezer and drop plate flask stripping squeezer machines, direct draw roll over machines, roll over rock down machines and rock over drop draft machines. Represented by H. R. Atwater, E. S. Carman, J. H. Galloway, E. F. Streich, M. W. Zeman, E. T. Doddridge and J. A. Patterson.
- Oxweld Acetylene Company, Chicago, Ill.—Welding of iron, steel and aluminum castings and the cutting of steel billets and risers with the Oxweld cutting blow pipe. Represented by W. S. Hoyt and others.
- Pangborn Corporation, Hagerstown, Md.—Sand blast machines in various sizes, sand blast barrel in operation, new sand blast car, sand separator, sand dryer, modern moisture and oil separator, also photographs of work done and installation at various times. Represented by Thomas W. Pangborn, John C. Pangborn, H. D. Gates and Foster J. Hull.
- Pawling & Harnischfeger Company, Milwaukee, Wis.—New type of crane trolley; a 3-ton hoist and ¾-cu. yd. grab bucket in operation on a special structural frame; also I-beam trolleys, motors and controllers. Represented by A. G. Hendricks, A. Fritsch, R. A. S. Johnson and Bruno Fritsch.
- J. W. Paxson Company, Philadelphia, Pa.—Sand blast machines, tilting sand blast tumbling barrels, hand cleaning machines and suction elevator and separator; also a number of blue prints and photographs showing recent installations.
- Peerless Parting Company, Ottawa, Ill.—Booth for the reception of visitors. Represented by C. A. Hupp.
- Pennsylvania Steel Company (Maryland Steel Company), Philadelphia, Pa.—Mayari pig iron. Represented by F. P. Bassett and Robert Gross.
- Peterson-National Company, Chicago—Core oil, dry core compound and parting and an electrically operated core oven. Represented by James A. Drake.
- Pickands, Brown & Co., Chicago, Ill. (in conjunction with Baird & West, Detroit, Mich.)—Solvay coke arranged in the form of a miniature Gibraltar. Represented by Frank T. Lovering, Thomas W. Glascoot, B. T. Bacon, E. A. Bateman, R. S. Dutton, C. L. Miner, G. A. T. Long, F. L. Schulze and J. A. Galligan.
- Pittsburgh Pneumatic Company, Canton, Ohio—Chipping and riveting hammers, etc. Represented by H. W. Tucker and others.

- Henry E. Pridmore, Chicago, Ill.—Molding machines, including stripping plate, rock-over drop, power squeezer, plain electric-driven jarring, combination electric jolt, rock-over drop, electric jolt stripping plate, power ramming stripping plate and hand squeeze stripping plate machines. Represented by Mrs. E. M. Pridmore, H. A. Pridmore, A. V. Magnuson, T. J. Magnuson, R. F. Eagan, C. H. Ellis and Arthur Leiding, the last named of London, England.
- Prest-O-Lite Company, Inc., Indianapolis, Ind.—Two complete Prest-O-Welder outfits for oxy-acetylene welding with 100-ft. and 300-ft. Prest-O-Lite cylinders; also samples of welding done with the outfit, which will be in operation. Represented by George D. Armstrong, E. J. Rork, W. H. Atkinson and L. L. Sinclair.
- Quigley Furnace & Foundry Company, Springfield, Mass.—Continuous baking core ovens of the reel type, suitable for oil, gas, coke or coal fuel; formerly made by the Rockwell Furnace Company, which is now owned by the Quigley Furnace & Foundry Company. Represented by W. S. Quigley, William Brewster, H. B. Dempsey, Paul Ramp and A. W. Moyer.
- Quitman Foundry & Machine Company, Quitman, Ga.—Casting machine and samples of iron, brass and aluminum castings produced by it, including soft and chilled castings. The machine is one which has just been patented. Represented by W. W. McCaster.
- Ransom Mfg. Company, Oshkosh, Wis.—Portable grinding machine, which will be exhibited by the Norton Company.
- Robeson Process Company, Pennington, N. J.—Glutrin. Represented by D. S. Robeson, W. E. Baird and T. J. Ryan.
- W. D. Robinson Company, Owosso, Mich.—Robinson polishing machine in operation for polishing flat and oval castings with attachment for polishing tubing. Represented by W. B. Robinson and George Valentine.
- Rochester Boring Machine Company, Rochester, N. Y.—Exhibit as part of the Essley Machinery Company. Represented by J. G. Wonn and W. H. Shafer.
- Rockford Drilling Machine Company, Rockford, Ill.—Four-spindle vertical chucking gang drill machining bevel gear blank forgings.
- Rock Island Mfg. Company, Rock Island, Ill.—Vises for machine shop and foundry use. Represented by E. W. Scott, O. J. Shields and C. E. Shields.
- Rogers, Brown & Co., Cincinnati, Ohio—Pig iron, coke, ferromanganese, Rosiclar fluorspar and castings made of the company's product, which includes 65 different iron brands. In addition to this display, in a special auditorium located in the south half of the South Straightaway, will be shown the company's motion pictures, "From Mine to Molder." The auditorium will seat about 400 people and the pictures will be shown five times daily during the exposition. Represented by M. Cochran Armour, E. L. Billingslea, H. B. B. Yergason, C. A. Stillman, F. I. Foote, C. E. Bertie, L. C. Calkins, A. B. Weaver, A. O. Sonne, H. S. Smith, E. L. Ives, W. S. Rogers, F. J. Waldo, G. R. Sullivan, William P. Cheney, S. W. Hubbard, O. Arlt, R. W. Clark, J. C. Mears, F. W. Bauer, R. D. Meacham, Edwin Raum, Perrin Rule and C. J. Olsen.
- P. H. & F. M. Roots Company, Chicago, Ill.—Blower, which will be shown as a part of the S. Obermayer Company exhibit.
- Sand Mixing Machine Company, Greenfield, Ohio—Sand cutting machines, one self-propelled and especially designed for the safety of the operator, and the other a machine which is swung from a bridge crane and is especially adapted for heavy machinery foundries. Represented by V. E. Minich, W. A. Heartt and H. H. Haley.
- William Sellers & Co., Inc., Philadelphia, Pa.—Sand-mixing machines, belt and motor-driven; universal tool-grinding and shaping machines, motor-driven, and drill-grinding machines, motor-driven. Represented by Edward J. Hölljes and S. A. Smith.
- Shepard Electric Crane & Hoist Company, Montour Falls, N. Y.—Hoists, including a two-motor pulpit-controlled overhead electric traveling hoist and a 10-ton electric traveling crane trolley; also samples of the types of gearing which enter into the construction of these machines. Represented by R. H. McGredy, F. A. Hatch, W. B. Briggs and N. Prakken.
- Silica Products Company, Chicago, Ill.—Specimens of the results obtained by the use of Kleen Kast facing and wash, also Claronite, a new fluxing compound and scavenger which decreases sulphur and phosphorus in cupola or ladle.
- W. W. Sly Mfg. Company, Cleveland, Ohio—Sand blast mill equipment, photographs of installations and descriptive literature. Represented by W. C. Sly, George J. Fanner, P. W. Graue and T. J. Morgan.
- R. P. Smith & Sons Company, Chicago, Ill.—Safety congress shoes for molders and foundrymen. Represented by J. B. Smith, Jr.
- Snead & Co. Iron Works, Jersey City, N. J.—Improved Macdonald roller ramming machine with gear drive, Macdonald pattern-drawing machine, lever operated; several patterns for ornamental iron castings, stove plates and radiator work, also castings from these patterns, as well as agricultural implement castings, soil pipe, etc. In connection with the machine will be used a dumping box for handling the sand, as well as overhead tracks with air hoists, etc. The equipment will be for the use of flasks 8 ft. x 30 in. Represented by H. P. Macdonald, P. W. Jordan and Ira S. Snead.
- Springfield Machine Tool Company, Springfield, Ohio—Will show in connection with the Essley Machine Company 14-in. x 6-ft. Ideal engine lathe complete; also a 15-in. friction head Fox monitor turret lathe. Represented by E. S. Montanus.
- Standard Sand & Machine Company, Cleveland, Ohio.—Standard improved sand mixer, core and facing sand mixer, mixer with hopper, boot and elevator, mixer with revolving screen, rolling, mixing and bonding machine and centrifugal sand pulverizer. Represented by H. G. Boughton, J. A. Boughton, H. E. Boughton, F. S. Scoville, R. S. Hoffman and J. L. Hopper.
- Sterling Wheelbarrow Company, West Allis, Wis.—Rolled steel foundry flasks, special wheelbarrows for foundry work, wedges, skim gates and gate sticks.
- Stow Mfg. Company, Binghamton, N. Y.—Portable electric grinders, electric breast drills, Gee Whiz machine for light drilling and grinding, and various electric devices involving the use of the Stow flexible shaft. Represented by the H. E. Barton Tool & Supply Company, Chicago.
- Frederic B. Stevens, Detroit, Mich.—Booth for the reception or visitors. Represented by James F. Hughes, Jr., and Alfred T. Wagner.
- W. F. Stodder, Syracuse, N. Y.—Cyclone suction sand blast nozzle for cleaning castings, scale from boiler tubes and boilers, rust from iron and steel work and similar uses. Represented by W. F. Stodder.
- Superior Sand Company, Cleveland, Ohio.—Molding sand for the production of aluminum, light and heavy brass, light, heavy and medium gray iron and malleable castings, as well as special sands for carwheel and heavy machine work. Represented by H. C. Koontz and Thomas Moore.
- Tabor Mfg. Company, Philadelphia, Pa.—Photographs and literature.
- Titanium Alloy Mfg. Company, Niagara Falls, N. Y.—Various grades of alloys of the company's manufacture and specimens of treated and untreated metals. Represented by H. H. Cook and Charles Vickers.
- U. S. Molding Machine Company, Cleveland, Ohio—Three sizes of plain jar molding machines, new type of combination jar ram squeezing pattern-drawing machine, combination jar ram squeezing molding machine, plain air squeezer, combination jar ram roll over pattern drawing and swing out molding machine, which is a new development since the last convention. Represented by J. N. Battenfeld and C. F. Battenfeld.
- United States Graphite Company, Saginaw, Mich.—Booth for the reception of visitors. Represented by Mr. Drought, Chicago sales manager, and Mr. Webb and Mr. Williams, also of Chicago.
- Vulcan Engineering Sales Company, Chicago, Ill.—Products of the Mumford Molding Machine Company, Q M S Company, Hanna Engineering Works, etc. These will include a Mumford electric cam jolter, pattern-drawing mechanism, split pattern machines, vibrators and blow valves; Q M S steel foundry cold metal saw, bar cutting cold metal saw, automatic saw grinder, cranes, trolleys and hoists, Hanna Engineering Works pneumatic and electric sand shakers, rotary dumping riddle, pneumatic yoke riveter, portable pneumatic punch, mold dryer and Milwaukee sprue cutter and other machines and appliances. This exhibit will weigh between 40 and 50 tons. Represented by E. H. Mumford, James T. Lee, J. T. Georgeson, J. J. Mumford, Carl Falk, W. H. Huelster, A. B. Calen and David M. Whyte.
- Wadsworth Core Machine & Equipment Company, Akron, Ohio—Core machines on iron tables and legs, cutting-off and conning machines on iron tables and legs, Detroit jar ramming machines, sand mixing and compounding mill, core testing machine, core oven with gasoline stove and sample cores made on the Wadsworth machine. Represented by G. H. Wadsworth and M. C. Sammons.
- J. F. Webb Mfg. & Supply Company, Davenport, Iowa—Molding machines and various sizes of vibrators for attachment to pattern plates. Represented by J. F. Webb.
- West Haven Mfg. Company, New Haven, Conn.—New type Acme power hack saw demonstrated with power. Represented by Frank S. Bradley and D. Ellis Bell.
- Whiting Foundry Equipment Company, Harvey, Ill.—Converter, 2-ton, with motor-operated tilting capacity, 6000-lb. teapot spout ladle, standard two-motor electric crane trolley operating a Watters quick-detachable grab bucket, section of standard drawer type core oven, standard exhaust tumbling barrel; photographs and blue prints showing latest layouts of foundry plants, etc. Represented by C. A. Hardy, P. A. Dratz, R. E. Prussing, R. H. Bourne and others.
- Wiener Machinery Company, New York—Triple combination punch shear and bar and angle cutter. Represented by George A. Cooley, Jesse J. Bowen, R. B. Franken, Ernst Wiese, George J. Ballweber and F. H. Scantlebury.
- T. A. Willson & Co., Inc., Reading, Pa.—Willson safety eye protectors of a design new since the last convention. Represented by Frederick Willson, Harold W. Davie and B. T. Roberts.
- Wilmarth & Morman Company, Grand Rapids, Mich.—Motor-driven wet surface grinding machine in operation; direct-connected motor-driven New Yankee drill grinders; combination cutter, reamer and drill grinder, also other styles of drill grinders, water tool grinders, lathe center grinders, etc. Represented by S. O. Livingston, E. T. Gorham and H. L. Saunders.
- E. J. Woodison Company, Detroit, Mich.—Booth for the reception of visitors. Represented by E. J. Woodison, E. B. Fleury, J. A. Disney, R. H. Mills and M. A. Bell.
- Wright Mfg. Company, Lisbon, Ohio—Hoists and trolleys of various capacities suspended from an I-beam 12 ft. above the floor, so that the equipment can be operated. Represented by H. H. Wright, C. F. Wright, R. C. Blair and F. W. Henderson.
- Wyoming Shovel Works, Wyoming, Pa.—Shovels and scoops for foundry trade. Represented by G. E. Geer.



In the Arena

The Ajax Metal Co., 114.
 Albany Sand & Supply Co., 28.
 Arcade Mfg. Co., 5 to 31.
 Baird & West, 3.
 Blake & Knowles Steam Pump Works.*
 Jonathan Bartley Crucible Co., 91 and 93.
 Benjamin Elec. & Mfg. Co., 115.
 S. Birkenstein & Sons, 68.
 A. Buch's Sons Co., 84, 86, 88, 90, 92.
 Castings, 85 and 87.
 Cataract Refining & Mfg. Co., 62.
 Clipper Belt Lacer Co., 63.
 Cowan Truck Co., 24.
 Crawford Oil & Chemical Co., 50 and 52.
 Joseph Dixon Crucible Co., 39.
 Stanley Doggett.
 Emmert Mfg. Co.*
 Felt & Tarrant, 40.
 The Garden City Sand Co., 58 and 60.
 General Electric Co., 6.
 Goldschmidt Thermit Co., 61.
 The Hill & Griffith Co., 73.
 Independent Pneumatic Tool Co., 18.
 International Molding Machine Co., 33 and 34.
 Interstate Sand Co., 46.
 The Iron Age, 20, 22, 53, 55.
 Charles C. Kavin Co., 51.
 T. P. Kelly & Co., 83.
 David Lupton's Sons Co., 30.
 MacLean Publishing Co., 26.
 McLain's System, 26.
 The Metal Industry, 42.
 The Monarch Engineering & Mfg. Co., 70.
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 Ohio Fire Brick Co.*
 Ohio Sand Co., 44.
 The Osborn Mfg. Co., 72, 74, 76, 78, 80, 82.
 Peerless Parting Co., 36.
 Penton Publishing Co., 10, 12, 43, 45.
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 R. P. Smith & Sons Co., 113.
 The Standard Sand & Machine Co., 99.
 Sterling Wheelbarrow Co., 71.
 Frederic B. Stevens, 75.
 Superior Sand Co., 54.
 The Tabor Mfg. Co., 57 and 59.
 The Titanium Alloy Mfg. Co., 89.
 The United States Graphite Co., 48.
 E. J. Woodison Co., 79.

*With S. Obermayer Co.

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 American Machinist, 213.
 American Tool Works Co.†
 E. C. Atkins & Co., Inc., 207.
 The Automatic Transportation Co., 222.

Ayer & Lord Tie Co., 264.
 Baker Brothers.†
 Barnes Drill Co.‡
 Bennett-O'Connell Co., 202.
 Charles H. Besley & Co., 239, 241, 243, 245.
 The Bullard Machine Tool Co.†
 Carborundum Co., 256, 258, 260.
 The Cincinnati Bickford Tool Co.†
 The Cincinnati Milling Machine Co.†
 The Cincinnati Planer Co.†
 Cincinnati Pulley Machinery Co.‡
 Thos. E. Coale Lumber Co., 266, 268, 270.
 Diamond Machine Co.‡
 E. L. Essley Machinery Co., 206, 208, 210, 212, 229.
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 Greeves, Klusman & Co.†
 Hannigan Mfg. Co., 259.
 Hoskins Mfg. Co., 205.
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 International Machine Tool Co.‡
 Kempsmith Mfg. Co.‡
 Landis Machine Co.†
 La Salle Mach. & Tool Co.‡
 The Lodge & Shipley Mach. Tool Co.†
 Manufacturers' Equipment Co., 215.
 Marshall & Hushart Mach. Co., 226 to 236 and 247 to 257.
 Norton Co., 225, 227.
 The Norma Co. of America, 262.
 Oliver Machinery Co., 242, 244, 246, 263, 265, 267.
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 The Wm. V. Robinson Co., 220.
 Rochester Boring Machine Co.†
 Rockford Drilling Machine Co.†
 Rock Island Mfg. Co., 238.
 Springfield Machine Tool Co.‡
 West Haven Mfg. Co., 221.
 The Willard Machine & Tool Co.†
 Wilmarth & Morman Co., 237.

†With Marshall & Hushart Machinery Co.

‡With E. L. Essley Machinery Co.

In the North Building

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 Blystone Machinery Co., 367.
 Brown Specialty Machinery Co., 218 and 320.
 The Buckeye Products Co., 347.
 Carter Metal Cleaning Co.
 Cleveland Pneumatic Tool Co., 346.
 Curtis Pneumatic Mach. Co., 302 and 304.
 Davis-Bournonville Co., 358.
 Dings Electric-Magnetic Separator Co., 334.
 Duplex Shaker Works, 322.
 Federal Foundry Supply Co., 306 and 308.
 Gardner Governor Co., 332.
 Great Western Mfg. Co., 360.
 Great Western Smelting & Refining Co., 336.
 Hayward Co., 342 and 344.
 Hoewel Sandblast Machine Co., 315, 317, 319, 321, 323.
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 The Knickerbocker Co., 311.
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 The MacLeod Co., 356.
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 Pangborn Corporation, 327, 329, 331.
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 The Sand Mixing Machine Co., 361, 363, 365.
 William Sellers & Co., Inc., 326, 328.
 Shepard Electric Crane & Hoist Co., 314 and 316.
 The W. W. Sly Mfg. Co., 338 and 340.
 The Wadsworth Core Machine & Equipment Co., 355, 357.
 J. F. Webb Mfg. & Supply Co., 312.
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 Globe Steel Co., 401.
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 Pennsylvania Steel Company, 437 and 438.
 Peterson National Co., 433 and 440.
 Pittsburgh Pneumatic Co., 405.
 Silica Products Co.
 Stow Mfg. Co., 405.
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 Quitman Foundry & Machine Co., 436.
 The Wyoming Shovel Works, 410.

In the North Straightaway

The Berkshire Mfg. Co., 509 and 511.
 Davenport Machine & Foundry Co., 518 and 520.
 Herman Pneumatic Machine Co., 513, 515, 517.
 Mumford Molding Machine Co.‡
 O. M. S. Co.‡
 The Sneed & Co. Iron Works, Inc., 510, 512, 514, 516.
 The U. S. Molding Machine Co., 519, 521, 523.
 Vulcan Engineering Sales Co., 501, 503, 505, 507, 502, 504, 506, 508.

‡With Vulcan Engineering Sales Co.

PLAN OF EXHIBITION OF THE FOUNDRY & MACHINE EXHIBITION COMPANY, CHICAGO, OCTOBER 10 TO 17, TOGETHER WITH LIST SHOWING LOCATION OF EXHIBITORS.

A Newly Designed Foundry Cupola*

Sloping Tuyeres Resulting in Higher Temperatures—Division into Three Definite Zones

A new cupola furnace has been designed by the Compagnie Générale de Fonderies, Brussels, Belgium, with a view to melting pig iron with a small consumption of fuel

with a valve so that the blast can be shut off and diverted to another furnace if necessary.

Fig. 2 shows the disposition of the diverging twin tuyeres, which direct the blast uniformly over the whole sectional area of the furnace, while restricting the height of the zone of fusion. The tuyeres are directed downward at an angle of 5 deg., an arrangement which gives rise to a higher temperature, and therefore increases the rapidity of fusion with a low degree of oxidation.

Internally the furnace is not cylindrical all the way up, being divided into three definite zones—the crucible, the fusion zone and the shaft. The crucible may be wider than the other zones, though this increases the quantity of coke required at starting. The shaft is slightly truncated, to prevent scaffolding, and tapers very gradually where it joins the fusion zone. At *a* the sectional area is 0.14 sq. in. per lb. of pig iron produced per hour; and this area is reduced by 35 per cent. at the fusion zone, in order to concentrate the charge and give a layer of coke of sufficient depth.

The automatic discharge enables the furnace to be emptied quickly; at the same time a large proportion of the coke can be recovered, and the slag is prevented from scaffolding against the sides of the furnace.

In order to prevent loss of heat by radiation from the crucible and shaft, a space is left between the lining and casing, which space is filled up with granulated slag or broken clinker, and allows for the expansion of the lining. The throat of the furnace is provided with an annular cast iron plate, in two pieces, to support the protective lining of cast iron blocks. The diameter at *b* (Fig. 1) is equal to nine-tenths that at *a*, while the diameter at *c* (crucible and tuyere zone) is four-fifths that at *A*. The chimney is lined with about 2 in. of firebrick.

Machinist's Hammer with a Composition Head

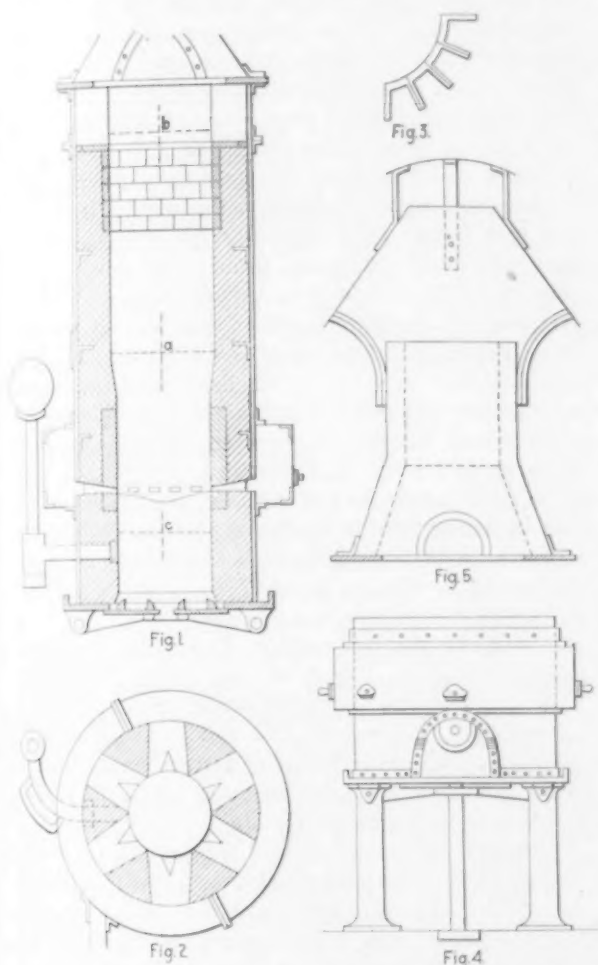
For use on machine tool and automobile work, the Westfield Plate Company, Thompsonville, Conn., has brought out a lead hammer with interchangeable or removable heads. The handle is made of malleable iron and is finished by tinning, and the heads are made of a special mixture of lead and antimony, adopted to secure toughness. The field for which these hammers is intended is the forcing of various parts, which cannot be done with a hard hammer head, on account of the marring of the work. The heads are slipped on the end of the handle and



A Recently Developed Hammer with a Malleable Iron Handle and a Lead Head Designed Especially for Use in Machine and Repair Shops

are kept in place by a nut which screws on the threaded portion of the end of the handle.

The United Gas Improvement Company, Philadelphia, has issued a booklet entitled "Accident Prevention—Safety First," which is an amplified revision of an illustrated address on accident prevention in certain public utilities, given at the public policy meeting of the 36th annual convention of the National Electric Light Association, Chicago, June 4, 1913. It consists principally of photographs of situations in industrial operations which are the source of serious accidents. There are also illustrations of methods of preventing such occurrences.



Various Sections of a New Foundry Cupola

and of motive power for the blast, and at the same time reducing the upkeep for lining. Fig. 1 is a vertical section through the center of the furnace; Fig. 2, a transverse section through the medium plane of the tuyeres; Fig. 3, a horizontal section through a portion of the cast iron blocks protecting the throat of the furnace against wear and distortion; Fig. 4, a rear elevation showing the general arrangement of the cupola, the relative position of the circular main for distributing the blast among the twin tuyeres, the position of the hole for working the slag, and the special device for automatically discharging the furnace at the bottom when the charge is finished, and Fig. 5, an elevation of the separate chimney stack with protecting hood and spark arrester.

The iron plate outer casing is made in two sections of equal or unequal height, a large socket ring being riveted on the top of the lower section so as to form a support for the upper one. This arrangement facilitates transport and mounting and allows free expansion of the parts. Angle-iron rings, 4 x 4 in., are riveted inside the casing, at intervals of 40 in., to support the firebrick lining, and enable this latter to be replaced in sections as required. The circular main for distributing the blast is made in two parts bolted together so as to hold, friction-tight, on the casing, and to be easily taken apart for repairs or cleaning. This main is of large dimensions, so as to maintain the initial pressure of the blast and insure uniform distribution among the tuyeres. The connection with the main supply pipe is of large rectangular section, arranged so as to impart a gyratory motion to the blast, and fitted

*From *Fer et Acier*.

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THE IRON AGE

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Manufacturers' Advantages in the Home Market

For the first time in the experience of the present generation of general buyers of iron and steel, attention is being directed to the possibility of purchasing abroad at prices equal to or below those named by American manufacturers. The reductions in duty in the new tariff are so great that inquiries are being made into foreign prices for the purpose of determining whether or not more favorable purchases can be made abroad. As on some commodities the duty has been completely wiped out, it would appear that in those articles possibilities should exist of covering requirements abroad more cheaply than at home.

A consideration of conditions governing trade carries with it the belief that, after all, the sober judgment of buyers will cause them to go slowly in the attempted diversion of their orders from home manufacturers to foreign sources of supply. In the first place, the inducement to purchase abroad will have to be substantial, or a buyer will hesitate to make trade connections with foreign manufacturers. If the material which has heretofore been obtained from the home manufacturers has been satisfactory in quality, finish, size and method of delivery, the buyer will expect to secure from a foreign maker equally satisfactory treatment, except perhaps in the matter of delivery. If he has no immediate use for the article purchased, but desires it for future wants, he will be able to await the convenience of the foreign makers, but otherwise the length of time which must elapse until an order can be filled would strongly militate against such a purchase. A small saving in price would not compensate for delay in receiving shipments or for any departure from the character of the product he has been in the habit of using.

Another matter which will weigh strongly in the balance against making purchases abroad is the fact that American buyers are accustomed to having quick communication with their sources of supply. If a shipment is not quite what it should be in some respect, if any trouble is found with regard to weights, if any undue delay is experienced, the buyer communicates with the seller by over-night mail, by inexpensive telegram or by long distance telephone, and the matter is quickly adjusted. This is one of the strong reasons why American manufacturers have been able to build up such an excellent trade in Canada, despite the fact that British goods have a preference in the Canadian tariff. The nearness of the Canadian buyer to the American manufacturer has been a factor in this trade which has overcome the possibility of buying at a lower price in England, but subject to the inconvenience of being at a long distance from the source of supply.

The question of credits is something which will have quite a bearing on this question. The American buyer is known to the manufacturer, and if he desires time is able to get it, but if he purchases abroad his payments must be in cash against the bill of lading. This feature of trade is one which will prevent many American buyers from placing orders abroad.

A source of infinite trouble, in case much business should be done with foreign manufacturers, is found in the ad valorem rates of duty now so generally imposed by the new tariff. The question will come up undoubtedly as to whether the customs authorities of this country will take as their basis of values the prices made by German, British and Belgian makers to buyers in their own country or the special prices

they make for export. Two sets of prices prevail in all these countries. Our custom-house appraisers do not necessarily take as their basis on which to levy duties the amount given in the invoice, but make inquiry with regard to the prices on merchandise prevailing in the country of origin. At times of extraordinary demand for iron and steel we have had importations from Europe, and in all such times controversies have arisen with regard to the duties levied on an ad valorem basis. That experience would therefore not only be repeated, but would be more widely felt in view of the more general adoption of the principle of ad valorem rates.

The conclusion which follows a consideration of these various matters is that, unless foreign prices fall so low that the margin should become wide between them and the prices of American manufacturers, our purchases of iron and steel products abroad are not likely to be greatly increased under the new tariff.

The Foundrymen's Movement

Twenty years of marked progress in American foundry practice lie between the foundrymen's convention at Chicago next week and the meeting of 1893 in the same city, at which the Western Foundrymen's Association was formed. That organization and the Philadelphia Foundrymen's Association, which was started two years earlier and was known as the Foundrymen's Association because there was then no other, were responsible for the formation of the American Foundrymen's Association at Philadelphia in 1896. The eighteenth convention of the national organization, which opens at Chicago October 14, is significant in more than one way of the tremendous strides in foundry operation and equipment in recent years. That its machinery exhibits should draw so many hundreds to the meeting place shows how far the mechanical engineer has succeeded in lifting the foundry out of its low estate of 20 years ago. And when one recalls the crude papers that were featured at foundrymen's meetings in the early eighteen-nineties, such a programme as is offered at Chicago becomes a marvel of the first order.

The spectacular character of the great exhibits at these annual meetings should not prevent full recognition of the work of the three educational organizations—the American Foundrymen's Association, the American Institute of Metals and the Associated Foundry Foremen. Under the lead of the first named there has been in the foundry world a movement paralleling that which has put steel works practice so much farther ahead in the past 20 years, and one relatively quite as important. The immeasurable advancement of foundry metallurgy, the creation of a new status of foundry apprenticeship, the establishment of foundry cost finding on a sounder basis, the development of economies in metallurgy, mechanics and management that were not dreamed of in the old days—this is in part the record of the association movement. And it has much good work yet to do.

In giving unusual space in this issue to topics made timely by the great foundry gathering at Chicago, we would urge again the importance of maintaining the foundry associations and making them more effective. There is just now up the question of a severance of the relations that have existed for seven years between

the exhibition company and the three associations. Such an outcome would be unfortunate and every effort should be put forth to prevent it. Practical questions have come up, bringing out the diverse interests of the two wings. The exhibition company finds itself handicapped in going from city to city, while the associations are under the necessity of rotating their conventions. But it would be a mistake, from the standpoint of either side, to depart from the plan that has worked so well, of having the exposition and the meetings for papers and discussions at the same place at the same time. However, if a separation is decided on for 1914, the exposition going again to Chicago and the conventions to some Eastern city, no doubt the result would be to make more certain a union of forces in following years. Neither wing of the movement can well get on long without the other.

The Low Price of Sheets

It is customary to regard the finished steel market as having yielded very slightly from the advanced level which prevailed last winter, and to be very far from the distressingly low level which prevailed about the beginning of 1912, representing the final outcome of the long decline of 1910-11. It is a striking point, therefore, that the price of black sheets, relative to their raw material, sheet bars, is now as low as it was at the extreme low point. During the last three months of 1911 our market reports quoted No. 28 gauge black sheets at 1.85 cents, while late in February the quotation dropped to 1.80 cents, and stayed at that level during March. For the whole of this period the average quoted price of sheet bars was slightly above \$20. The spread between a gross ton of sheet bars and a net ton of sheets was about \$16. To-day, with the sheet market quoted at 2.05 cents, the spread is substantially the same. At the low point of a year and a half to two years ago it was claimed the average sheet mill stood to lose money, the actual cost of conversion between a gross ton of sheet bars and a net ton of sheets being not under \$17. Apparently the sheet mill is no better off to-day.

It is of interest to observe, however, that at the top of the market the independent sheet mill, not provided with its own steel mill, was hardly any better off. The top of the market was 2.35 cents, or \$47 a net ton, and deducting the conventional \$17 leaves \$30 for sheet bars. There were times early this year when sheet bars could be picked up only in limited quantities, if at all, at \$30.

It was many years ago that the lessening spread in the open market between billets and slabs on the one hand and merchant bars and plates on the other made it impossible for the independent bar mill or plate mill to purchase unfinished steel and finish it into bars or plates at a profit. As a commercial proposition such a detached operation was eliminated. Somewhat the same economic force has been at work in the sheet market, but the conditions in the sheet trade have been sufficiently different to keep it from prevailing. In the first place, there has been an extremely rapid growth in the demand for sheets, and in the second place the industry is largely specialized so that there is definite work for the independent sheet mill to do, in ascertaining the particular needs of the various consumers and in endeavoring to meet them. The steel manufacturer who has a sheet bar mill cannot engage in the manu-

facture of sheets, in tonnages proportionate to his steel production, with the same facility as he can engage in the manufacture of merchant bars or plates. The latter products, in common parlance, "offer a better outlet for steel."

Thus between two opposing economic forces the independent sheet mill, without a steel making adjunct, is permitted on the one hand to survive, but on the other hand is not permitted to make the profit its proprietor thinks is his due. At the same time the business has been steadily attracting new capital in recent years and there has been continued extension of existing plants.

"Official" Prices

The tenacity with which terms that at one time were significant will maintain their hold long after conditions have changed is illustrated in the manner in which iron and steel prices are frequently referred to in the non-technical press. Financial writers in the daily papers are still possessed of the idea that prices of finished iron and steel are established by an understanding among makers, notwithstanding the fact that a complete change was wrought in this respect several years ago. Discussing trade conditions, the term "official" is still frequently being used in these journals in referring to prices being named on iron and steel products. This is in face of the fact that no "official" prices have prevailed for a long time and that every effort has been made by manufacturers to convince the public that no agreement nor understanding whatever applies to iron and steel prices. There is not today, and has not been for many months, any price of iron or steel so uniformly maintained as to carry with it the suspicion of an agreement or understanding among makers. The nearest approach to anything looking like a maintained price is in the case of steel bars, but in that trade peculiar conditions have prevailed with respect to the demand, enabling manufacturers to maintain their prices. Yet even in the case of steel bars it is currently known that departures have been made when necessary to secure contracts from the largest consumers. Notwithstanding the disclaimers, however, it appears likely that the daily press will continue to believe that there is such a thing as an "official" price.

The New Metal Schedule.—The full text of the Metal Schedule of the Underwood Tariff Act, as given in *The Iron Age* of October 2, has been reprinted in convenient pamphlet form. Copies of the reprint will be sent to subscribers asking for them.

At the meeting of the Engineers' Society of Western Pennsylvania held in its rooms in the Oliver Building, Pittsburgh, on Tuesday evening, September 30, James Lord, president, American Iron & Steel Mfg. Company, Lebanon, Pa., read a paper on "The Use of Pulverized Coal in Metallurgical Furnaces." Discussion of the paper was participated in by H. R. Barnhurst, engineer, Fuller Engineering Company, Allentown, Pa.; E. W. Shinn, chief engineer, Quigley Furnace & Foundry Company, Springfield, Mass.; James W. Rawlins, superintendent of smelters, Canadian Copper Company, Copper Cliffs, Ontario; A. W. Raymond, Raymond Brothers Pulverizing Company, Chicago, Ill.; William A. Evans, manager Griscom-Russell Company, Boston, Mass.; E. D. Barry, superintendent Universal Portland Cement Company, Pittsburgh.

The Steel Trade and the Tariff

An Independent Manufacturer Takes the View That Imports Will Not Seriously Interfere with Profits

Interesting comment on the new tariff and its effect on the steel trade of the country is given in a Wall Street Journal article, which presents the view of "one of the large independent steel operators" of the country. As the statements of this manufacturer are for the most part in line with what heads of some other steel companies have said of the new tariff régime, we give below the greater portion of the article:

This manufacturer stated that he did not share wholly the views reported to have been expressed by Mr. Schwab; on the contrary he is less disturbed over the prospects of foreign competition than he is over competition at home. While Germany is the most important producer of steel abroad, yet her total output is less than one-half that of the United States, and as Germany consumes at home about one-half of her production, the amount available for export, even if all were shipped to the United States, would be less than one-quarter of our requirements here. It is not, however, at all likely that Germany would prefer our markets to the exclusion of her old and established foreign trade, as the United States market could not be obtained except at a tremendous sacrifice in German profits. To enter this market would mean sales by Germany at substantially cost and the abandonment of Germany's old trade at remunerative rates.

The principal effect of the new tariff bill will be to bring domestic markets in much closer relationship with the markets of the world, and ultimately stability in values of domestic steel products will obtain in this market, as wide fluctuations will be minimized under a low tariff. As a suggestion of the influence on home markets of German and Belgium competition when the new law becomes effective, it may be stated that current prices in Antwerp on the principal products, structural shapes, plates and bars for export are quotable at approximately 1c. per pound flat. At this price, if there are added the Underwood duty, freight, insurance and other charges, the approximate cost delivered New York would be \$1.30 per hundred, which price, with rail freight rates from Pittsburgh to New York, deducted, would net the Pittsburgh mills about \$1.12 per hundred. But this rate would be extreme and not probable, as domestic consumers would prefer to pay the home maker \$1 or \$2 per ton premium rather than wait upon foreign delivery or to establish a foreign credit and buy the material in bulk as would then be necessary, as against the convenience of buying at home in small quantities where credits are liberally extended and where the material is delivered in better condition. Allowing for practical influences of this kind, the German invasion, if it comes, would suggest prices which would substantially net better rates than were current during the year 1911, which rates were brought about by domestic competition alone. But as the United States Steel Corporation and others of the leading producers of steel reported fair earnings for the year 1911, it is quite apparent that the stories of danger to the American trade are too highly colored and are absurd on their face.

This manufacturer further stated that, in his opinion, a proper banking and currency bill was a matter of far more importance to the future of the steel trade than the tariff bill and he believed that if the bankers obtained a modification of the Owens-Glass bill, as had been recommended, the way would be paved for a forward business movement, for it is well to bear in mind that stocks of merchandise in this country are thoroughly liquidated in anticipation of the change in tariff. Aside from the necessity of replenishing stocks, when one considers the enormous prospective requirements for steel, not only in this country but throughout the world, bearish opinions are difficult to maintain. Only a few months since, the steel capacity throughout the world was completely submerged by demand, months being required to fill orders, and only recently the trade here at home has emerged from that congestion. Yet we have ahead of us a natural increase in demand from growth of population which on an average represents an annual increase of approximately 10 per cent.; and on the top of this growth there is promised an extraordinary demand in this country at least, made prac-

tically mandatory by a government requirement of steel cars, with estimates running as high, for the replacement of wooden cars, as close to \$700,000,000.

Furthermore, the opening of the Panama Canal will unquestionably add to the present demand now in evidence for steel ships for coastwise and South American trade. Finally, considering the fact that we have a farm yield for the year 1913 estimated in value to exceed that of the year 1912 by \$300,000,000, even though there is a tonnage loss to the railroads, on account of decreased yield, we are far away from crop disaster and we therefore cannot justify a bearish forecast on this score. On the contrary, we may feel assured that steel is not "going out of style," and while decreased earnings may be looked for during the next six months in the steel trade, there is no cause for alarm, inasmuch as current earnings are far in excess of dividend requirements.

Benzol Manufacture in the United States

The H. Koppers Company, Chicago, is distributing in pamphlet form an article prepared by F. Püning, a graduate of the Technical University of Hanover, descriptive of "Benzol and Its Recovery from Coal Gas." In his introductory remarks the writer points out that the by-product coke oven has now become established in the United States beyond the reach of prejudice, and that with the utility of this type of oven recognized the complete development of other by-products in addition to tar and ammonium sulphate has become equally logical in this country as in Germany, where but few works lack benzol recovery plants. Referring to the large consumption of gasoline and its cost, the article states that 29,600,000 gals. of benzol is available annually from the 14,800,000 tons of coal consumed in the 6200 by-product coke ovens of the country, and can be sold as a substitute for gasoline at a profit of 24 cents for every ton of coke produced. A financial statement indicating the possible profits accruing from the operation of a benzol recovery plant is submitted by the author as follows:

"The profits of benzol plants in Europe are very high and have ranged from 50 to 100 per cent. during the last few years. In this country, on account of several circumstances, the profits are slightly lower. The following calculation as an average will be based on 2000 net tons of dry coal per day, and two gallons of benzol and homologues recovered from the gas from one net ton of coal:

Receipts per year:	
Benzol 67 per cent.....	978,000 gal.
Toluol 16 per cent.....	234,000 gal.
Xylol 8 per cent.....	117,000 gal.
Solv. naph. 9 per cent.....	131,000 gal.
	1,460,000 gal.
1,460,000 gal. at 15c. equal.....	\$219,000
Crude naphthalene, 330 net tons, at \$5, equal.....	1,650
Regenerated acid 40° Bc., 360 net tons at \$6, equal.....	2,160
	\$222,810
Expenses per year:	
Raw materials, as wash oil, sulphuric acid, caustic soda....	\$15,000
Steam for the different distillations, air compressor, loading pumps, acid regeneration and cooling water.....	15,000
Electric power for water pumps, oil pumps, agitator and illumination.....	6,200
Wages for three distillers and two helpers.....	5,000
Overhead expenses, fire insurance, maintenance and depreciation, assuming the cost of the complete plant to be about \$300,000.....	30,000
Calorific loss of the gases.....	13,000
	\$84,200
Profit yield: \$222,810 less \$84,200 equals \$138,610, which is 46 per cent. interest on the capital invested.	
Cost to produce one gallon: \$84,200 divided by 1,460,000 equals 5.8 cents.	

"The profits shown in this financial statement are dependent largely on the price of benzol. In the United States benzol will, without question, be used chiefly for automobiles and other internal combustion motors. Therefore, benzol is a competitor of gasoline, and the question of the market movement of benzol is covered by the same question regarding gasoline. Today, the supply of gasoline is becoming constantly more limited, and the demand is steadily increasing. Therefore, the price of gasoline is continually rising."

The paper also contains a detailed description of the chemistry, properties and uses of benzol, together with a technical description of the methods of recovery. It is il-

lustrated with views of various benzol recovery installations in Germany and also typical plant diagrams. Curves showing the trend of benzol prices and production are also included.

Working on New Tariff Regulations

WASHINGTON, D. C., October 7, 1913.—The Treasury Department is engaged in drafting regulations to bring the present ones in line with the new tariff law. On Friday last the Department issued the following telegraphic instructions to collectors of customs in the United States:

All the provisions of the customs regulations of 1908 and all other regulations of the department now in force relative to the importation and entry of merchandise under the tariff act of August 5, 1909, and other acts are hereby extended to the importation and entry of merchandise under the act of October 3, 1913, so far as applicable until such time as the same may be revoked, modified, or amended by the department. Such further regulations as are necessary will be issued promptly.

Such customs collectors as did not receive copies of the act on Saturday morning when it really became effective were instructed to "assess" duties equivalent to the Payne-Aldrich act which the Underwood-Simmons act succeeded. However, with the exception of the far Western customs offices, it is stated, the new rates were collected at the principal ports in the United States. Wherever the old rates are assessed and collected, between the time of the going into effect of the new law and the receipt of official copies of the act, the difference will be refunded without delay.

The department has not yet received any statistics as to the amount of importations either direct or from bonded warehouses since the going into effect of the act.

The department will hold that the act went into effect at midnight, Friday, October 3, although no goods were actually entered until after the custom houses opened Saturday morning.

W. L. C.

To Investigate Steel Car Construction

The Bureau of Standards of the Department of Commerce has been asked by the Interstate Commerce Commission to make an investigation relative to the construction of steel cars, and the statement is made at the department that the investigation will be made. No plans have yet been outlined by the bureau. This is the letter of the commission suggesting the investigation and giving the reasons therefor:

"The Interstate Commerce Commission has recommended that legislation be enacted requiring the use of modern steel equipment in passenger-train service. The exceedingly great number of fatalities resulting from rear-end collisions, the trains involved in which have been composed of wooden equipment, has brought this matter very prominently to the attention of Congress, and legislation will undoubtedly be enacted requiring the use of modern steel equipment. This will probably result in steel car manufacturers being overcrowded with orders, and in their desire to fill them with the least possible delay they may not build cars of the greatest possible strength. On this account the commission is apprehensive that, unless some study is made of steel car construction, in a few years we will be confronted with conditions similar to those which now confront us in the matter of defective wheels and rails. This matter is brought to your attention so that you may, if deemed expedient, have an investigation conducted by the Bureau of Standards relative to the best possible construction for steel cars. This commission is ready at any time to render any assistance that may be within its power."

Shipbuilding in Japan.—The shipbuilding encouragement bill, which was adopted in Japan in 1896, is described as having been of great benefit to the industry in that country. Up to the end of last year over 100 vessels, of an aggregate tonnage of 334,345 tons, had been built in Japan, and subsidies to the amount of about \$3,700,000 had been granted under the act. In view of the present state of development of the industry, there is a feeling in some quarters that the subsidy system should be abolished, but it is believed that the Japanese Government is not likely to consider such a step—at least, for the present.

Steel Works Output More

Merchant Pig Iron Less Last Month

Active Capacity October 1 Shows Some Increase Over That of September 1

The production of coke and anthracite pig iron in September, a 30-day month, was 2,505,927 gross tons, or 83,531 tons a day, against 2,545,763 tons in August, or 82,121 tons a day. Steel works furnaces, through better working than in the hot weather of August, showed a greater increase than the total, gaining 1800 tons a day on their performance in August, while the merchant furnaces made 400 tons a day less than in August. Thus there was a net increase last month of 1400 tons a day over August. The capacity active October 1, based on the September output, was 83,375 tons a day for 256 furnaces, against 82,226 tons a day for 259 furnaces on September 1. A new stack was blown in last month—furnace D of the Youngstown Sheet & Tube Company, Youngstown, Ohio.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from September, 1912, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons.

	Steel Works.	Merchant.	Total.
September, 1912	59,102	23,026	82,128
October	62,820	23,952	86,772
November	62,817	24,878	87,695
December	63,770	25,996	89,766
January, 1913	63,921	26,251	90,172
February	64,005	28,364	92,369
March	61,448	27,699	89,147
April	64,658	27,101	91,759
May	64,232	26,807	91,039
June	62,002	25,617	87,619
July	59,362	23,239	82,601
August	59,140	22,981	82,121
September	60,941	22,590	83,531

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in September and the four months preceding:

Monthly Pig-Iron Production—Gross Tons.

	May (31 days)	June (30 days)	July (31 days)	Aug. (31 days)	Sept. (30 days)
New York	193,112	186,818	174,050	178,777	176,882
New Jersey	10,906	10,996	10,922	11,006	10,800
Lehigh Valley	97,591	86,818	79,942	80,921	79,217
Schuylkill Valley	78,745	77,428	76,400	58,692	52,328
Lower Susquehanna and Lebanon Val.	64,548	52,500	51,553	53,044	48,713
Pittsburgh district	613,258	562,249	559,275	571,007	567,122
Shenango Valley	144,746	140,184	145,834	136,297	143,322
Western Pennsylv.	167,197	147,397	139,787	143,169	126,343
Maryland, Virginia and Kentucky	60,502	64,066	60,187	56,986	52,139
Wheeling district	128,618	122,584	120,160	117,580	109,057
Mahoning Valley	273,666	250,061	257,092	264,648	270,104
Central and North- ern Ohio	252,542	241,003	230,203	239,050	222,930
Hocking Valley, Hanging Rock and S. W. Ohio	41,291	38,271	33,273	34,192	34,798
Chicago district	405,605	389,949	372,754	356,572	345,338
Mich., Minn., Mo., Wis., Col., Wash.	78,493	71,407	68,966	66,096	64,263
Alabama	179,948	163,525	160,564	164,236	157,254
Tennessee	31,449	23,309	19,684	13,490	13,317
Total	2,822,217	2,628,565	2,560,646	2,545,763	2,505,927

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons.

	Pig, Total production			Spiegeleisen and ferromanganese		
	1911.	1912.	1913.	1911.	1912.	1913.
January	1,128,448	1,483,153	1,981,560	8,360	22,622	15,633
February	1,185,782	1,550,995	1,792,154	12,821	15,950	20,131
March	1,518,063	1,827,792	1,904,878	11,784	11,538	20,546
April	1,434,142	1,830,717	1,939,751	10,657	11,104	23,108
May	1,310,378	1,922,557	1,991,192	13,641	20,518	19,042
June	1,281,241	1,823,958	1,860,070	22,611	26,685	19,212
July	1,316,646	1,803,205	1,840,216	17,067	26,522	22,310
August	1,460,610	1,843,404	1,833,352	14,579	24,225	20,680
September	1,490,898	1,773,073	1,828,232	17,757	22,484	24,555
October	1,560,884	1,947,426	.....	19,697	27,252	.....
November	1,452,907	1,884,524	.....	19,678	17,461	.....
December	1,453,446	1,976,870	.....	20,068	18,523	.....

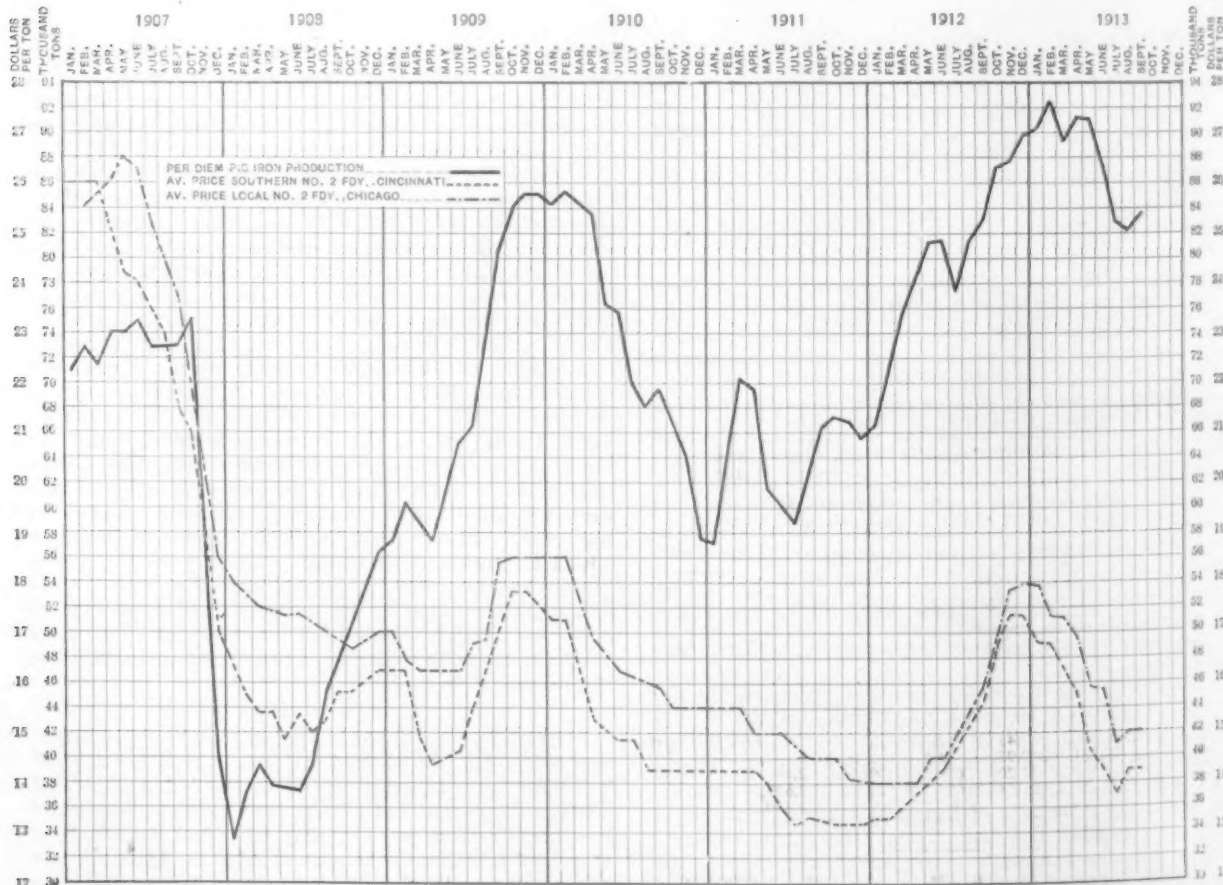


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to October 1, 1913; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Capacity in Blast October 1 and September 1

The following table shows the daily capacity, in gross tons, of furnaces in blast October 1 and September 1 by districts:

Location of Furnaces.	Coke and Anthracite Furnaces in Blast.		Oct. 1		Sept. 1	
	Total number of stacks.	Number in blast.	Capacity per day.	Number in blast.	Capacity per day.	
New York:						
Buffalo	19	16	5,638	16	5,468	
Other New York....	7	2	325	2	305	
New Jersey	7	2	360	2	355	
Pennsylvania:						
Lehigh Valley	22	9	2,558	9	2,494	
Spiegel	2	1	82	1	77	
Schuylkill Valley	16	7	1,744	7	1,805	
Lower Susquehanna....	7	5	1,019	5	1,070	
Lebanon Valley	10	4	695	4	640	
Pittsburgh District ..	52	45	19,601	45	18,642	
Spiegel	4	4	575	2	327	
Shenango Valley	19	14	4,661	15	4,590	
Western Pennsylvania	27	15	4,486	16	4,728	
Maryland	4	3	875	3	723	
Wheeling District.....	14	10	3,607	11	3,793	
Ohio:						
Mahoning Valley ...	25	23	8,767	24	8,963	
Central and Northern	24	20	7,431	20	7,217	
Hocking Val., Hanging						
Rock, & S. W. Ohio	15	10	1,259	9	1,077	
Illinois	34	26	11,171	26	11,030	
Spiegel	2	1	161	1	124	
Mich., Wis. and Minn.	10	6	1,272	6	1,215	
Colo., Mo. and Wash..	8	2	648	3	903	
The South:						
Virginia	24	5	548	6	720	
Kentucky	5	2	296	2	292	
Alabama	46	21	5,242	21	5,233	
Tennessee	20	3	444	3	435	
Total	423	256	83,375	259	82,226	

Among furnaces blown out were Hall in the Shenango Valley, Rebecca in western Pennsylvania, Pulaski and Alleghany in Virginia, Riverside in the Wheeling district, Mattie and No. 6 Ohio in the Mahoning Valley, No. 2 Joliet and No. 10 South Chicago in the Chicago district and one Pueblo in Colorado.

In the list of furnaces blown in last month were one Donora and one Clairton in the Pittsburgh district, Buena Vista in Virginia, new furnace D of the Youngstown Sheet & Tube Company in the Mahoning Valley, one Weston in the Hanging Rock district, one Iroquois and one Madeline (Inland) in the Chicago district.

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production, by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.

	1907.	1908.	1909.	1910.	1911.	1912.	1913.
January	71,149	33,918	57,975	84,148	56,752	66,384	90,172
February	73,038	37,163	60,976	85,616	64,090	72,442	92,369
March	71,821	39,619	59,232	84,459	70,036	77,591	89,147
April	73,885	38,289	57,962	82,792	68,836	79,181	91,759
May	74,048	37,603	60,753	77,102	61,079	81,051	91,039
June	74,486	36,444	64,656	75,516	59,585	81,358	87,619
July	72,763	39,287	67,793	69,305	57,841	77,738	82,601
August	72,594	42,851	72,546	67,963	62,150	81,046	82,057
September	72,783	47,300	79,507	68,476	65,903	82,128	83,531
October	75,386	50,554	83,856	67,520	67,811	86,722	.....
November	60,937	51,595	84,917	63,659	66,648	87,697	.....
December	39,815	56,158	85,022	57,349	65,912	89,766	.....

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1908—Gross Tons.

	1908.	1909.	1910.	1911.	1912.	1913.
Jan.	1,045,250	1,797,560	2,608,605	1,759,326	2,057,911	2,795,331
Feb.	1,077,740	1,707,340	2,397,254	1,794,509	2,100,815	2,586,337
Mar.	1,228,204	1,832,194	2,617,949	2,171,111	2,405,318	2,763,563
Apr.	1,149,602	1,738,877	2,483,763	2,064,086	2,375,436	2,752,761
May	1,165,688	1,883,330	2,390,180	1,893,456	2,512,582	2,822,217
June	1,092,131	1,930,866	2,265,478	1,787,566	2,440,745	2,628,565
July	1,218,129	2,103,431	2,148,442	1,793,068	2,410,889	2,560,646
Aug.	1,359,831	2,248,930	2,106,847	1,926,637	2,512,431	2,543,763
Sept.	1,418,998	2,385,206	2,056,275	1,997,102	2,463,839	2,505,927
Oct.	1,567,198	2,599,541	2,093,121	2,102,147	2,689,933	.....
Nov.	1,577,854	2,547,508	1,909,780	1,999,433	2,630,854	.....
Dec.	1,740,912	2,635,680	1,777,817	2,043,270	2,782,737	.....

New and promising deposits of iron ore are reported to have been discovered in the province of Sodermanland in central Sweden. They have already been opened up to some extent. The content of iron is said to run between 50 and 60 per cent.

Blast Furnace Notes

The furnace of the Napier Iron Works, Napier, Tenn., which has been out of blast since early July, was expected to go in this week.

For the first time in many months the Colorado Fuel & Iron Company has but two of its furnaces at Pueblo, Col., in blast, A furnace having gone out September 20.

Both furnaces of the Inland Steel Company at Indiana Harbor, Ind., are now in blast, the No. 2 stack having been blown in September 25.

The Iroquois Iron Company, South Chicago, Ill., blew in one of its smaller furnaces September 26. One of the larger new furnaces will be blown out at an early date.

The furnace of the Punxsutawney Iron & Steel Company, Punxsutawney, Pa., will probably be blown out within a few days.

One of the Riverside furnaces of the National Tube Company, at Benwood, W. Va., was blown out September 4 for complete relining.

The Pittsburgh Foundrymen's Association

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held in that city on the evening of October 6, preceded by a dinner. The attendance was large. L. R. Palmer, chief factory inspector of the State of Pennsylvania, spoke on "The State Department of Labor and Industries and the Foundry and Machine Trade." Dr. Richard Moldenke, secretary of the American Foundrymen's Association, was also present and told about the plans for the entertainment of the visiting foundrymen at the convention of the American Foundrymen's Association to be held in Chicago next week. Arrangements have been made by the Pittsburgh foundrymen, and a large number of them will attend the convention.

The Hamilton By-Product Coke Ovens, Ltd., capitalized at \$1,000,000, has been incorporated to build a plant at Hamilton, Canada. While considerable local capital will be invested in this enterprise, the majority of the stock will be held by United States capitalists. P. V. Burns, of the Ontario Pipe Line Company, and John G. Gauld, of Nesbit, Gauld & Langs, are two of the Hamilton men interested. The first unit will consist of 50 ovens, each of 16 tons capacity, operating 18 hours' coking time, with by-product apparatus for gas separation, coal preparing plant, power compressing and water pumping plant, etc., and a 5,000,000 cu. ft. gas holder. The plant will be electrically equipped and will carbonize 1000 tons of coal per day, making 700 tons of coke for 365 days in the year. The company will keep on hand a six months' supply of coking coal which will be imported from Pennsylvania or West Virginia.

Members of the United Sons of Vulcan employed in the puddling mills of the Youngstown Sheet & Tube Company are taking a referendum vote on the proposition of declaring the mills open and working under the sliding scale now in use by the Amalgamated Association. The Sons of Vulcan scale called for a flat rate of \$7 a ton, while the Amalgamated Association scale is on a sliding basis, rising and falling with the price of bar iron. The company's puddling mills at East Youngstown, also the puddling plant of the A. M. Byers Company at Girard, Ohio, and several in the Pittsburgh district have been idle since July. The men formerly employed in these plants are getting very restless, and are showing a strong desire to get back to work.

Papers on rope driving, tests of line-shaft bearings, enameling steel and iron, steel freight cars, cleaning producer gas, the use of gears in machine tool drives, grouping machine tools and cast iron for machine tools are to be presented to the American Society of Mechanical Engineers at its annual meeting in New York, December 2 to 4. The formal presentation of the Grasshof medal bestowed by the Verein Deutscher Ingenieure on George Westinghouse last June at its Leipzig meeting will be made on Wednesday evening, December 3.

The Iron and Metal Markets

Uncertainty as to Prices

The New Tariff Causes Hesitation

Increased Output by Steel Works Furnaces— Falling Off in New Business

Iron and steel manufacturers and consumers are quite at sea as to the course of demand and prices in the remainder of the year. With the signing of the new tariff bill there has been let loose an assortment of rumors naming definite reduction in prices of various products, usually \$2 a ton. In general, these statements are founded only on the conceded possibility of placing good-sized orders at lower prices than the mills have been quoting.

Business has fallen off and in the past week there has not been enough really to try out prices. Consumers are waiting partly to see what the lower tariff brings to pass, and a dull market may be expected for some weeks. Aside from tariff effects there are present the usual symptoms of an attempt to find a new level after a period of well-sustained prices with its inevitable final limitation of buying.

Yet in the present confusion over prices the fact stands out that production, as well as consumption, is only fractionally less than at the high point of the year. In the quarter ending with September, 92 days, pig iron production was about 7,700,000 tons, or at the rate of 30,500,000 tons a year. The high rate of February represented about 34,000,000 tons a year, and output in the first half of 1913 was at the rate of 33,000,000 tons a year.

Our September pig iron statistics show that the steel companies increased upon their August output. The total for all coke and anthracite furnaces was 2,505,927 tons for the 30 days, or 83,531 tons a day, against 2,545,763 tons in August, or 82,121 tons a day. The steel works furnaces produced 60,941 tons a day last month, an increase of 1800 tons a day over August, while the merchant furnaces produced 22,590 tons a day, or 400 tons a day less than in August.

Due to generally better working of furnaces last month than in August and to the blowing in of a number of large furnaces in September, while several small furnaces blew out, the rated capacity of the 256 furnaces in blast October 1 was 83,375 tons a day, against 82,226 tons a day for 259 furnaces on September 1.

The beginning of rail buying is reported from Chicago, the Great Northern having placed 30,000 to 35,000 tons, including 5000 tons each to an Eastern Pennsylvania and a New York State mill. The Burlington order placed at Chicago is reported to be 35,000 tons. New York Central and Pennsylvania Railroad contracts are also looked for this month. An Eastern mill has an order from the Central Railroad of New Jersey for 6000 tons.

The Chicago & Northwestern order for 2500 cars is held up for the present. The Buffalo, Rochester & Pittsburgh is in the market for 1000 freight cars and the Mobile & Ohio for 500 gondolas. Railroad purchasing agents have sharply reduced their general iron and steel purchases lately, but there are limits to the continuance of that policy, even under ordinary maintenance.

Structural orders are only moderate. In the East business in plain material has gone at 1.35c., Pittsburgh. For the Broken Hill Proprietary Company's new steel plant at Newcastle, New South Wales, buildings have been placed at Pittsburgh calling for 3000 tons.

Some of the smaller plate mills have run out of orders lately and others are running single turn. Under these conditions 1.35c. Pittsburgh is more commonly quoted, though some business is still done at 1.40c.

Some easing of prices is reported in wire rods, wire products and shafting. Business in wire nails below the Ohio River has been done at \$1.60, Pittsburgh, and in plain wire at \$1.40, but the larger producers have not been willing to meet these prices.

As low as \$23 for foreign billets on the Atlantic seaboard has been quoted, but no sales for importation are known. Late sales by Eastern mills have been at \$25.

Pig iron is evidently affected by the conditions in steel products, the market being more hesitant, with indications that Southern iron is not quite so firm. Middlesborough No. 3 iron could now be delivered at Philadelphia at close to the domestic price for No. 2 plain, and there has been figuring on English iron for Eastern pipe works, but no buying thus far.

With the duty of \$2.50 off ferromanganese, the price at Baltimore has dropped from \$52.50 to \$50, and the market is not particularly firm at that figure.

The situation in Germany is more plainly one of overproduction and continued weakness, with the English steel market depressed in consequence. Foreign billet and sheet bar prices are being closely watched from this side.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous.	Oct. 8.	Oct. 1.	Sept. 10.	Oct. 9.
Pig Iron, Per Gross Ton:	1913.	1913.	1913.	1912.
Foundry No. 2 X, Philadelphia	\$16.00	\$16.00	\$15.75	\$17.25
Foundry No. 2, Valley furnace	13.85	14.00	14.00	15.75
Foundry No. 2, S'th'n. Cin'ti...	14.25	14.25	14.25	16.75
Foundry No. 2, Birmingham, Ala.	11.00	11.00	11.00	13.50
Foundry No. 2, furnace, Chicago*	15.00	15.00	15.00	17.00
Basic, delivered, eastern Pa.	15.50	15.25	15.00	17.00
Basic, Valley furnace	14.00	14.00	14.00	16.00
Bessemer, Pittsburgh	16.65	16.65	16.65	17.90
Malleable Bessemer, Chicago*	15.00	15.00	15.00	17.00
Gray forge, Pittsburgh	14.40	14.40	14.25	16.25
Lake Superior charcoal, Chicago	15.25	15.25	14.75	18.75
Billets, etc., Per Gross Ton:				
Bessemer billets, Pittsburgh...	23.50	24.00	25.00	25.00
Open-hearth billets, Pittsburgh.	23.50	24.00	24.00	26.00
Open-hearth sheet bars, Pgh...	24.50	25.00	25.00	26.50
Forging billets, Pittsburgh	29.00	30.00	30.00	32.00
Open-hearth billets, Philadelphia	25.00	25.00	26.00	28.00
Wire rods, Pittsburgh	26.50	27.00	27.50	28.50
Old Material, Per Gross Ton:				
Iron rails, Chicago	14.00	14.00	14.00	17.50
Iron rails, Philadelphia	17.50	17.50	17.50	17.50
Carwheels, Chicago	12.25	12.25	12.75	15.50
Carwheels, Philadelphia	12.50	13.00	12.50	14.50
Heavy steel scrap, Pittsburgh	12.00	12.00	12.25	15.75
Heavy steel scrap, Philadelphia	11.00	11.75	11.50	14.50
Heavy steel scrap, Chicago	10.00	10.00	10.25	13.50
No. 1 foundry cast, Pittsburgh	12.75	12.75	12.75	14.00
No. 1 foundry cast, Philadelphia	13.50	13.50	12.75	14.50
No. 1 foundry cast, Chicago (net ton)	10.50	10.50	10.75	13.75
Finished Iron and Steel,				
Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill...	1.25	1.25	1.25	1.25
Iron bars, Philadelphia	1.32½	1.32½	1.37½	1.55
Iron bars, Pittsburgh	1.55	1.55	1.55	1.50
Iron bars, Chicago	1.30	1.35	1.40	1.50
Steel bars, Pittsburgh	1.40	1.40	1.40	1.40
Steel bars, New York	1.56	1.56	1.56	1.56
Tank plates, Pittsburgh	1.40	1.40	1.40	1.45
Tank plates, New York	1.51	1.56	1.56	1.61
Beams, channels and angles, Pgh.	1.40	1.40	1.40	1.45
Beams, channels, angles, N. Y.	1.51	1.56	1.56	1.61
Skelp, grooved steel, Pittsburgh	1.35	1.35	1.35	1.30
Skelp, sheared steel, Pittsburgh	1.45	1.45	1.45	1.35
Steel hoops, Pittsburgh	1.60	1.60	1.50	1.45
Sheets, Nails and Wire,				
Per Pound to Large Buyers:				
Sheets, black, No. 28, Pittsburgh	2.05	2.05	2.15	2.15
Galvanized sheets, No. 28, Pgh.	3.10	3.10	3.20	3.30
Wire nails, Pittsburgh	1.65	1.65	1.65	1.70
Cut nails, f.o.b. Eastern mills	1.70	1.70	1.75	1.70
Cut nails, Pittsburgh	1.55	1.55	1.60	1.60
Fence wire, ann'd, 0 to 9, Pgh.	1.45	1.45	1.45	1.50
Barb wire, galv., Pittsburgh	2.05	2.05	2.05	2.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Coke, Connellsville,

Per Net Ton at Oven:	Oct. 8, 1913.	Oct. 1, 1913.	Sept. 10, 1913.	Oct. 9, 1912.
Furnace coke, prompt shipment	\$2.15	\$2.15	\$2.25	\$3.15
Furnace coke, future delivery..	2.25	2.25	2.25	2.50
Foundry coke, prompt shipment	2.90	2.90	2.90	3.25
Foundry coke, future delivery..	3.00	3.00	3.00	3.00

Metals.

Per Pound to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Last copper, New York.....	16.87½	16.62½	16.87½	17.87½
Electrolytic copper, New York	16.50	16.50	16.62½	17.70
Spelter, St. Louis.....	5.30	5.45	5.75	7.45
Spelter, New York.....	5.45	5.60	5.90	7.60
Lead, St. Louis.....	4.42½	4.50	4.65	4.95
Lead, New York.....	4.57½	4.65	4.75	5.10
Tin, New York.....	40.80	40.75	42.50	50.00
Antimony, Hallett's, New York	7.25	7.75	7.75	9.50
Tin plate, 100-lb. box, Pittsburgh	\$3.50	\$3.50	\$3.50	\$3.60

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c. to 1.45c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base. Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in. Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive fire box steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in., up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.50
Widths over 130 in.....	1.00
Cutting to lengths, under 3 ft., to 2 ft., inclusive.....	.25
Cutting to lengths, under 2 ft., to 1 ft., inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.40c. to 1.45c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.....	.10
H-beams over 18 in.....	.10
Angles over 6 in. on one or both legs.....	.10
Angles, 3 in. on one or both legs, less than ¼ in. thick, as per steel bar card, Sept. 1, 1909.....	.70
Tees, structural sizes (except elevator, hand rail, car-truck and conductor rail).....	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.....	.20 to .80
Deck beams and bulb angles.....	.30
Hand rail tees.....	.75
Cutting to lengths, under 3 ft., to 2 ft. inclusive.....	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.....	.50
Cutting to lengths, under 1 ft.....	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Rods and Wire.—Bessemer, open-hearth and chain rods, \$26.50 to \$27. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.45; galvanized, \$1.85. Galvanized barb wire, to jobbers, \$2.05; painted, \$1.65. Wire nails, to jobbers, \$1.65.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

	Plain Wire, per 100 lb.
Nos. 0 to 9	10
11 12 & 12½	13
14	15
15	16
Annealed	\$1.65 \$1.70 \$1.75 \$1.80 \$1.90 \$2.00 \$2.10 \$2.20
Galvanized	2.10 2.15 2.20 2.25 2.30 2.40 2.50 2.60

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe (full weight), in effect from August 8, 1913, and iron pipe (full weight), from June 2, 1913:

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
¼, ¾ and ¾.....	73	54	54	¾ and ¾.....	66	47	47
¾.....	77	66½	66½	¾.....	65	46	46
¾ to 3.....	80	71½	71½	¾.....	69	56	56
				¾ to 2½.....	72	61	61

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
2.....	76	67½	67½	1½.....	56	45	45
2½ to 6.....	78	69½	69½	1½.....	67	56	56
7 to 12.....	75	64½	64½	2.....	68	58	58
13 to 15.....	52	..	..	2½ to 4.....	70	61	61
				4½ to 6.....	70	61	61
				7 to 12.....	68	55	55

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
1 to 3, butt.....	78	69½	69½	1 to 1½, butt.....	70	59	59
2, lap.....	74	65½	65½	2, butt.....	70	59	59
2½ to 6, lap.....	76	67½	67½	1½, lap.....	54	43	43
				1½, lap.....	65	54	54
				2, lap.....	66	56	56
				2½ to 4, lap.....	68	59	59

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
¾, ¾ and ¾.....	68	57½	57½	¾.....	63	52	52
¾.....	73	66½	66½	¾.....	67	60	60
¾ to 1½.....	77	70½	70½	¾ to 1½.....	71	62	62
2 to 3.....	75	71½	71½	2 and 2½.....	72	63	63

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
2.....	73	64½	64½	1½.....	65	59	59
2½ to 4.....	75	66½	66½	2.....	66	58	58
4½ to 6.....	74	65½	65½	2½ to 4.....	70	61	61
7 to 8.....	67	56½	56½	4½ to 6.....	69	60	60
9 to 12.....	62	51½	51½	7 and 8.....	63	53	53
				9 to 12.....	58	47	47

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
¾.....	63	56½	56½	¾.....	57	49	49
¾ to 1½.....	66	59½	59½	¾ to 1½.....	60	52	52
2 to 2½.....	68	61½	61½	2 and 2½.....	62	54	54

Inches.	Steel.	Black.	Galv.	Inches.	Iron.	Black.	Galv.
2.....	63	56½	56½	2.....	55	49	49
2½ to 4.....	65	58½	58½	2½ to 4.....	60	54	54
4½ to 6.....	64	57½	57½	4½ to 6.....	59	53	53
7 to 8.....	57	46½	46½	7 to 8.....	52	42	42

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads on lap-welded steel, in effect from May 20, 1913, and standard charcoal-iron boiler tubes, in effect from January 1, 1913, are as follows:

Lap-Welded Steel.	Standard Charcoal Iron.
1½ and 2 in.....	60
2½ in.....	57
2½ and 2¾ in.....	63
3 and 3½ in.....	67
3½ to 4½ in.....	69
5 and 6 in.....	63
7 to 13 in.....	60
1½ in.....	44
1½ and 2 in.....	48
2½ in.....	44
2½ to 2¾ in.....	53
3 and 3½ in.....	55
3½ to 4½ in.....	58
5 and 6 in.....	58
7 to 13 in.....	58

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2½ in. and larger, over 22 ft., 10 per cent. net extra.
Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.	Cents per lb.
Nos. 3 to 8.....	1.55 to 1.60
Nos. 9 and 10.....	1.60 to 1.65
Nos. 11 and 12.....	1.65 to 1.70
Nos. 13 and 14.....	1.70 to 1.75
Nos. 15 and 16.....	1.80 to 1.85

Box Annealed Sheets, Cold Rolled.	Cents per lb.
Nos. 10 and 11.....	1.70 to 1.80
No. 12.....	1.70 to 1.80
Nos. 13 and 14.....	1.75 to 1.85
Nos. 15 and 16.....	1.80 to 1.90
Nos. 17 to 21.....	1.85 to 1.95
Nos. 22 and 24.....	1.90 to 2.00
Nos. 25 and 26.....	1.95 to 2.05
No. 27.....	2.00 to 2.10
No. 28.....	2.05 to 2.15
No. 29.....	2.10 to 2.20
No. 30.....	2.20 to 2.30

Galvanized Sheets of Black Sheet Gauge.	Cents per lb.
Nos. 10 and 11.....	2.10 to 2.20
No. 12.....	2.20 to 2.30
Nos. 13 and 14.....	2.20 to 2.30
Nos. 15 and 16.....	2.35 to 2.45
Nos. 17 to 21.....	2.50 to 2.60
Nos. 22 and 24.....	2.65 to 2.75
Nos. 25 and 26.....	2.80 to 2.90
No. 27.....	2.95 to 3.05
No. 28.....	3.10 to 3.20
No. 29.....	3.25 to 3.35
No. 30.....	3.40 to 3.50

Pittsburgh

PITTSBURGH, PA., October 8, 1913.

It is the consensus of opinion of the larger steel manufacturers here that they will not be seriously hurt by the new tariff. The fact that the tariff bill has been passed, so that the steel makers and the trade now know what changes have been made in duties, is a distinct advantage in that it removes all uncertainty and gives a definite standard on which to base future business. With the gradual adjustment of prices to a lower level all along the line, the question of labor is now before employers for careful consideration, and it is possible that within the very near future the workmen will be asked to bear their share of the depression existing and the lower prices ruling by accepting a lower wage. Employers will hesitate no doubt before reducing labor, but if further serious declines in prices occur, it may become a necessity. The local situation is extremely dull in every way, and not enough is being sold to fix prices. It is distinctly a buyer's market, and on almost any material that could be named, if a consumer came in the market for a round tonnage, he could no doubt shade any prices that are being quoted to-day. There has as yet been no serious break in values, and the steel trade is not showing any signs of being panic stricken. It is believed that if a common sense policy is allowed to prevail for the next few weeks the situation in the steel trade will work out all right, and that confidence will be at least partially restored. Just now consumers are in no mood to buy anything more than actual wants require. The fact that prices are steadily settling to a lower basis is an added reason why any large buying movement in the near future is not to be expected.

Pig Iron.—Not a single large new inquiry is in the market for pig iron. The Standard Sanitary Mfg. Company may buy this week 4000 to 5000 tons of foundry iron, and this is the only known business under negotiation. Prices are holding fairly steady. A local foundry is reported to have bought 3000 to 4000 tons of malleable Bessemer iron for delivery over the remainder of the year at about \$14.25, Valley furnace. Several furnaces are naming \$13.85 at furnace for No. 2 foundry. We quote: Bessemer, \$15.75; basic, \$14 to \$14.25; No. 2 foundry, \$13.85 to \$14; malleable Bessemer, \$14.25 to \$14.50, and gray forge \$13.50, all at Valley furnace, the freight rate for delivery in the Pittsburgh or Cleveland district being 90c. a ton.

Billets and Sheet Bars.—Not enough steel is being sold to establish a market. Nearly all makers are actively seeking new business, but consumers are either covered by contracts or else are not inclined to buy, looking for lower prices. Monthly adjustments of prices are being made on sliding scale contracts to meet the lower prices being put out by the smaller steel mills. Effective October 1, Youngstown mills adjusted contracts for sheet and tin bars to the basis of \$23.50, Youngstown, equal to \$24.50 delivered in the Pittsburgh district. Local consumers are being importuned to make offers for steel, but are not doing so, as nearly all have regular sources of supply. We quote open-hearth and Bessemer billets for prompt delivery and for shipment over the remainder of the year at \$23 to \$23.50, and Bessemer or open-hearth sheet bars for the same delivery at \$23.50 to \$24, maker's mill, Youngstown. We quote Bessemer and open-hearth billets at \$23.50 to \$24 and Bessemer and open-hearth sheet bars at \$24 to \$24.50 f.o.b., maker's mill, Pittsburgh. We quote forging billets at \$29 to \$30 and axle billets \$25 to \$26, maker's mill. The differential existing now between billets and sheet bars is not more than 50c. a ton.

Steel Rails.—As yet no active inquiries for rails for 1914 have come out from the leading roads, but they are looked for this month or early in November. Small lots of standard sections are being freely placed. The coal business this year has been prosperous and this has been reflected in an active demand for light rails from the coal mining companies. Last week the Carnegie Steel Company received new orders and specifications for nearly 4500 tons of light rails. The re-rolling mills are still shading prices on light rails about \$2 a ton over rails rolled from billets. The Ohio works of the Carnegie Steel Company, which for some months have been rolling open-hearth rails, is now running on sheet bars. The company states that its two rail mills at Bessemer are pretty well filled for this year. We quote splice bars at 1.50c. per lb. and standard section rails at 1.25c. per lb. Light rails are quoted as follows: 25, 30, 35, 40 and 45 lb. sections,

1.25c.; 16 and 20 lb., 1.30c.; 12 and 14 lb., 1.35c., and 8 and 10 lb., 1.40c., all in carload lots, f.o.b. Pittsburgh.

Muck Bar.—This material is scarce, due to the long shutdown of several local and Youngstown mills, and as high as \$33 and \$34, Pittsburgh, is being quoted for muck bar made from all pig iron. Eastern muck bar is still being offered at about \$30.40 per gross ton, delivered in the Pittsburgh district.

Plates.—Specifications against contracts made some time ago are coming in at a fair rate, but very little new business is being placed and nearly all the mills are much in need of orders. Some of the smaller mills are down entirely, and others are being operated single turn. The Buffalo, Rochester & Pittsburgh is inquiring for 1000 cars but it is not believed there will be much buying until the Interstate Commerce Commission has decided whether the railroads will be allowed to advance freight rates. The larger mills are holding sheared plates at about 1.40c., but the smaller mills are naming 1.35c. We quote ¼-in. and heavier plates at 1.40c., but on a desirable order 1.35c. could be done.

Structural Material.—There has been a fair amount of new inquiry and some work has been placed. The American Bridge Company has taken 2100 tons for the Masonic Temple in this city, the material to be Carnegie shapes to be rolled by the Carnegie Steel Company. The original plans for this structure called for Bethlehem shapes. The same interest has taken about 600 tons for a new bridge for the Pittsburgh & Lake Erie Railroad at Lowellville, Ohio. The McClintic-Marshall Construction Company has taken 1000 tons for miscellaneous buildings for the Otis Steel Company at Cleveland, about 600 tons, made up of small jobs, and a pier shed at Providence, R. I., 1100 tons, which will be fabricated at its shops at Pottstown, Pa. Prices on structural steel are fairly strong, and it is claimed 1.40c. has not been shaded. We quote beams and channels up to 15-in. at 1.40c. to 1.45c., Pittsburgh.

Wire Rods.—Not much new business is going, the demand being only for small lots. We note a sale of 300 tons of open-hearth rods for prompt delivery at \$27, Pittsburgh. We quote Bessemer and open-hearth wire rods at \$26.50 to \$27, Pittsburgh.

Ferroalloys.—The duty of \$2.50 on ferromanganese having been removed, the price is now \$50, seaboard. There is no new inquiry, consumers in this district being covered for the remainder of this year and in some cases into first quarter and first half of next year. We note sales of several carloads of 50 per cent. ferrosilicon at the full price of \$75, delivered in the Pittsburgh district. We quote 80 per cent. foreign ferromanganese at \$50, Baltimore, the freight rate to the Pittsburgh district being \$2.16 a ton. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at \$75; over 100 tons to 60 tons, \$74; over 600 tons, \$73, Pittsburgh. We quote 10 per cent. ferrosilicon at \$22; 11 per cent., \$23, and 12 per cent., \$24, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnaces. We quote 20 per cent. spiegeleisen at \$25 at furnace. We quote ferro-titanium at 8c. per lb. in carloads; 10c. in 2000-lb. lots and over, and 12c. in lots up to 2000 lb.

Skelp.—In sympathy with other lines of finished material, prices on skelp are not so firm as they have been and new demand is quiet. Both grooved and sheared iron skelp continue somewhat scarce on account of the long shutdown of some of the puddling mills in the Pittsburgh and Youngstown districts. We quote grooved steel skelp at 1.35c. to 1.40c.; sheared steel skelp, 1.40c. to 1.45c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.65c. to 1.70c., delivered to buyers' mills in Pittsburgh district.

Iron and Steel Bars.—Makers report that the new demand for steel bars is still quite active, and specifications against contracts are coming in freely. In fact, steel bars for some time have been the most active item on the whole list of finished material. Local mills report they are pretty well filled with actual orders over the entire year. There is a fair demand for iron bars, and prices are firm on account of the scarcity of muck bar. At yet local warehouses have not made any reductions in prices on steel bars and other material for prompt delivery, but this is looked for within a short time. We quote steel bars for forward delivery at 1.40c. and for shipment from warehouse in small lots at 1.90c. We quote iron bars at 1.55c. to 1.65c. The mills charge \$1 extra per ton for twisting ¾-in. and larger steel bars and \$2 extra for ½ to ¾ in. In some cases, however, these extras are being shaded.

Sheets.—The very low prices ruling for sheets have brought out a moderate amount of new business and several mills report actual orders booked in the past few weeks as considerably heavier than for some time.

Unless there should be further serious declines in prices of sheet bars it is figured out that present prices of sheets are about as low as they can profitably go. Some of the sheet makers are not operating to more than 50 per cent., while others report they are running nearly full. The American Sheet & Tin Plate Company continues to operate its hot sheet mill capacity full time up until Friday morning of each week, and then the mills shut down after the second turn, so that this company is running very close to 75 per cent. of capacity. A number of leading consumers of sheets are anxious to contract for a long period ahead at present prices, but some mills have refused to accept these contracts, believing that within the next two or three months prices may show betterment. It is a fact, too, that some jobbers made contracts for sheets some time ago when prices were higher than they are now, and are refusing to specify against these contracts, but are buying sheets in the open market from other mills. We quote Nos. 9 and 10 blue annealed sheets at 1.60c. to 1.65c.; No. 28 Bessemer black, 2.05c. to 2.15c.; No. 28 galvanized, 3.10c. to 3.20c.; No. 28 tin mill black plate, 2.15c. to 2.20c., and No. 30, 2.20c. to 2.25c. These prices are f.o.b. Pittsburgh, in carload and larger lots, jobbers charging the usual advances for small lots from store.

Tin Plate.—Several local makers of tin plate figure out that the new 15 per cent. ad valorem duty will not allow foreign makers of tin plate to sell their product on this side. At present 107-lb. cokes are quoted at about 13s. 6d., Swansea, Wales, and figuring this back to 100 lb. it would mean about \$3 per base box, Swansea. A duty of 15 per cent. ad valorem would mean \$3.45, foreign works, and 20c. freight would make the price \$3.65, f.o.b. New York. The present price of domestic 100-lb. cokes is \$3.50, Pittsburgh, and adding 17c. freight to New York would mean \$3.67, delivered. There is no doubt that domestic consumers would prefer tin plate made in this country even if the price is 5c. to 10c. a box higher, as the matters of quality, service, delivery and other considerations enter. There is not much new demand for tin plate, and specifications against contracts have quieted down a good deal. Tin plate mills are running from 50 to 75 per cent. of capacity, but present contracts will be pretty well cleaned up within the next month or six weeks. We quote 100-lb. cokes at \$3.50 to \$3.60 and 100-lb. ternes at \$3.35 to \$3.45, f.o.b. Pittsburgh.

Railroad Spikes.—New demand continues quiet and is only for small lots to cover actual needs. Specifications from the railroads have been very dull for some time and all the makers of spikes are badly in need of orders. We quote railroad spikes in base sizes, $5\frac{1}{4} \times 9/16$ in., at \$1.65 to \$1.70, and small railroad and boat spikes in carload and larger lots at \$1.75 to \$1.80 per 100 lb., f.o.b. Pittsburgh.

Bolts and Rivets.—A fair amount of new business is going in nuts and bolts, some makers stating they are pretty well filled up with orders over the next two months, but consumers are buying very cautiously, not being satisfied that present discounts will be held. The new demand for rivets is only fair and specifications from boiler shops and other consumers have quieted down. We quote button-head structural rivets at \$1.90 in large lots and \$2 in small lots, and cone-head boiler rivets at \$2 in large lots and \$2.10 in small lots, terms 30 days net, less 2 per cent. for cash in 10 days. Regular discounts on nuts and bolts are as follows in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works:

Coch and lag screws	.....80 and 10% off
Small carriage bolts, cut threads	.....75 and 5% off
Small carriage bolts, rolled threads	.....75 and 10% off
Large carriage bolts	.....70 and 2% off
Small machine bolts, cut threads	.....75 and 10% off
Small machine bolts, rolled threads	.....75, 10 and 5% off
Large machine bolts	.....70 and 7½% off
Machine bolts with C.P.C. and T nuts, small	75 and 5% off
Machine bolts with C.P.C. and T nuts, large	.....70% off
Square hot pressed nuts, blanked and tapped	.....\$5.70 off list
Hexagon nuts	.....\$6.30 off list
C.P.C. and R. square nuts, tapped and blank	.....\$5.70 off list
Hexagon nuts, $\frac{3}{4}$ and larger	.....\$6.60 off list
Hexagon nuts, smaller than 9/16	.....\$7.20 off list
C.P. plain square nuts	.....\$5.20 off list
C.P. plain hexagon nuts	.....\$5.50 off list
Semi-finished hexagon nuts, $\frac{3}{4}$ and larger	......85% off
Semi-finished hex. nuts, smaller than 9/16	85 and 10% off
Rivets, 7/16 x 6½, smaller and shorter	75, 10 and 10% off
Rivets, metallic tinned, bulk	.....3½c. per lb. net extra
Rivets, tin plated, bulk	.....1½c. per lb. net extra
Rivets, metallic tinned, packages	.....70, 10 and 10% off
Standard cap screws	.....75, 10, 10 and 7½% off
Standard set screws	.....75, 10, 10 and 7½% off

Shafting.—New demand is quiet and confined to small lots to cover actual needs. The large consumers that placed contracts some time ago are holding up

specifications and all the makers of shafting are in need of orders. We quote cold-rolled shafting at 60 per cent. off in carloads and 55 per cent. in small lots delivered in base territory, but on any desirable business 62 per cent. off is being named.

Hoops and Bands.—As most consumers are covered for some time ahead, there is little new demand, but mills report specifications coming in at a fair rate. We quote bands at 1.40c., extras as per the steel bar card, and steel hoops at 1.60c., Pittsburgh.

Wire Products.—New demand is only for small lots, but wire makers report that specifications against contracts are coming in quite freely and shipments by the mills are fairly heavy. Some weakness in prices on wire and wire nails has again developed, one or two mills offering wire nails on desirable orders at \$1.60 and plain annealed wire at \$1.40. Several other makers claim, however, they are not as yet meeting these prices. We quote: Wire nails to jobbers, \$1.65; cut nails, \$1.60; plain annealed wire, \$1.45; galvanized barb wire, \$2.05, and painted barb wire, \$1.65, f.o.b. Pittsburgh, per 100 lb., usual terms, actual freight added to point of delivery.

Merchant Steel.—Mills report that specifications against contracts are not satisfactory, and shipments at present are lighter than for some time. Hardly enough material is being sold to establish the market and nominal prices, which are more or less shaded, are as follows: Iron finished tire, $1\frac{1}{2} \times \frac{1}{2}$ in., and larger, 1.40c., base; under $1\frac{1}{2} \times \frac{1}{2}$ in., 1.55c.; planished tire, 1.60c.; channel tire, $\frac{3}{4}$ to $\frac{1}{2}$ and 1 in., 1.90c. to 2c.; $1\frac{1}{4}$ in. and larger, 2c.; toe calk, 2c. to 2.10c., base; flat sleigh shoe, 1.75c.; concave and convex, 1.80c.; cutter shoe, tapered or bent, 2.30c. to 2.40c.; spring steel, 2c. to 2.10c.; machinery steel, smooth finish, 1.85c. We quote cold-rolled strip steel as follows: Base rates for 1 in. and $1\frac{1}{2}$ in. and wider, under 0.20 carbon, and No. 10 and heavier, hard temper, 3.30c.; soft, 3.55c.; coils, hard, 3.20c.; soft, 3.45c.; freight allowed. The usual differentials apply for lighter gauges and sizes.

Standard Pipe.—A fair amount of new business is being placed in butt and lap weld pipe, several mills stating they are pretty comfortably filled with business over the remainder of the year. The fact that a readjustment in prices on steel pipe is looked for by the trade to become effective on or before November 15 may result later in a slowing up of new demand. It may be noted, however, that prices are guaranteed by the mills against decline to the date named. Discounts are fairly well maintained, and mills continue to report a very active demand for oil country goods, on which they are considerably back in deliveries.

Boiler Tubes.—There is a fair amount of new business being placed in locomotive and merchant tubes, but competition from the smaller mills is causing some irregularity in the prices, and regular discounts are not being firmly held. Some in the trade are looking for lower discounts on tubes to be named in the near future, but nothing official on this has been given out.

Coke.—P. J. Brennan, president of the Producers Coke Company, Uniontown, Pa., states that his company sold in September upward of 75,000 tons of furnace coke for October delivery at \$2.50 per net ton at oven. The new demand at present is very quiet, and choice grades of furnace coke can readily be had at \$2.25 per net ton at oven, while some grades that are not regarded as strictly standard can be had as low as \$2.10 at oven. We note sales of 25 to 30 cars of furnace coke at \$2.10 at oven, and about 5000 tons for October delivery of standard grade furnace coke at \$2.15 at oven. There is not much new inquiry for foundry coke, and prices are weak. We quote standard makes of furnace coke for delivery over remainder of the year at \$2.15 to \$2.25, but the Producers Coke Company states that it is holding its coke at \$2.50 at oven. We quote best makes of 72-hr. foundry coke at \$2.85 to \$3 per net ton at oven.

Old Material.—Hardly enough scrap is being sold to establish a market. Consumers seem to have all the scrap they will need for some time and apparently are not interested in the low prices that are ruling. It is said that a good part or all of the heavy steel scrap in the list of the Pennsylvania Railroad noted last week was taken by a local consumer that has bought this scrap a number of times before. Sales are reported of about 3000 tons of selected heavy steel scrap at \$12.25 to \$12.50 delivered to consumers' mills in the Pittsburgh district. We also note sales of 800 to 1000 tons of cast iron borings at about \$8.25 delivered, and about 500 tons of turnings at \$7.25 delivered. While we do not reduce our general quotations on scrap this week, a consumer wanting a round tonnage of almost any kind and

agreeing to take it out promptly, could probably shade the prices from 25c. to 50c. per ton. Dealers are quoting as follows, per gross ton, for delivery in the Pittsburgh district:

Selected heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery....	\$12.25 to \$12.50
Ordinary steel scrap	12.00 to 12.25
Compressed side and end sheet scrap.....	10.50
No. 1 foundry cast	12.75 to 13.00
No. 2 foundry cast	11.50 to 11.75
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	7.25 to 7.50
Rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	13.75
No. 1 railroad malleable stock.....	11.50 to 11.75
Grate bars	8.25 to 8.50
Low phosphorus melting stock	15.25 to 15.50
Iron car axles	24.50 to 25.00
Steel car axles	17.50 to 17.75
Locomotive axles, steel	21.00 to 21.50
Locomotive axles, iron	25.50 to 26.00
No. 1 busheling scrap	12.00 to 12.25
No. 2 busheling scrap	7.50 to 7.75
*Machine shop turnings	7.25 to 7.50
Old carwheels	13.75 to 14.00
*Cast-iron borings	8.25 to 8.50
†Sheet bar crop ends	14.00 to 14.25
Old iron rails	14.50 to 14.75
No. 1 railroad wrought scrap	13.75 to 14.00
Heavy steel axle turnings	9.00 to 9.25
Stove plate	8.25 to 8.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.

†Shipping point.

Chicago

CHICAGO, ILL., October 6, 1913.

The firm grip in which the makers of steel are seeking to hold the market continues to be manifest. But the desire thus to protect contract prices now on their books has not been sufficient in all instances to prevent quotations on plates under 1.40c., Pittsburgh, and on structural shapes as low as 1.40c., Pittsburgh. In sheets, the general run of business is moving at what were minimum prices two weeks ago. Specifications for steel are reported as increased in volume. This is due in a considerable measure to the quiet buying of cars in the past fortnight, estimates placing the aggregate number in the neighborhood of 2500, exclusive of the Chicago & Northwestern inquiry. While formal contracts have not been signed, it is understood that the Chicago, Burlington & Quincy has arranged for 35,000 tons of rails and the Great Northern 25,000 tons, with the local mills. Bar iron and scrap are still the leaders in the market movement toward lower prices, and additional declines from the quotations of last week are noted. Pig-iron sales reached a somewhat larger total the past week as the result of activity in the Milwaukee district.

Pig Iron.—Interest during the past week centered prominently around the purchase of one of the Racine, Wis., malleable interests, whose requirements for the first half were among the first to be covered for that delivery. About 4000 tons of malleable and charcoal was purchased, and it is understood that on a considerable portion of the tonnage the quotation for charcoal iron compared favorably with that of coke iron on the basis of \$15 at Chicago furnace. For local iron the price of \$15 at the furnace is increasingly firm, and, on the basis of capacity in blast, shipments generally are understood to be exceeding the make. A number of sales of Southern iron are noted, including three lots of 300, 400 and 500 tons for first half delivery on the basis of \$11.50 and \$11.75. Birmingham. For delivery in October, standard Birmingham iron is still available at \$11.25, although \$11.50 is the ruling price for the last quarter. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a local switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 1, 2, 3, 4.....	\$15.25 to \$15.75
Northern coke foundry, No. 1.....	15.50 to 16.00
Northern coke foundry, No. 2.....	15.00 to 15.50
Northern coke foundry, No. 3.....	14.50 to 15.00
Southern coke, No. 1 foundry and No. 1 soft.....	16.10 to 16.60
Southern coke, No. 2 foundry and No. 2 soft.....	15.60 to 16.10
Southern coke, No. 3.....	15.10 to 15.60
Southern coke, No. 4.....	14.60 to 15.10
Southern gray forge	14.60 to 15.10
Southern mottled	14.10 to 14.60
Malleable Bessemer	15.00 to 15.50
Standard Bessemer	18.40
Basic	15.00 to 15.50
Jackson Co. and Kentucky silvery, 6 per cent.....	18.40
Jackson Co. and Kentucky silvery, 8 per cent.....	19.40
Jackson Co. and Kentucky silvery, 10 per cent.....	20.40

Rails and Track Supplies.—It is stated that rail sales have been consummated by the local mills of the

leading interest, covering 35,000 tons for the Chicago, Burlington & Quincy and 25,000 tons for the Great Northern. It is understood that both roads will buy additional tonnage, the Great Northern distributing its further purchases among Eastern mills. Contracting for track fastenings is also under way, and liberal bookings are reported. We quote standard railroad spikes at 1.70c. to 1.75c., base; track bolts with square nuts, 2.25c., base, all in carload lots, Chicago; tie plates, \$30 to \$32, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The aggregate tonnage of fabricated steel contracted for in the past week was swelled to larger proportions by the letting of 2728 tons for the new Crane Company plant to the American Bridge Company, and by the 1022 tons of bridge steel which the same fabricating company will furnish to the Chicago, Burlington & Quincy Railroad. Other contracts placed included 279 tons for the Lomax Theatre on Ashland avenue, Chicago, to the South Halsted Street Iron Works; 881 tons for the Chicago & Western Indiana Railroad locomotive shops, to the Lackawanna Bridge Company; 535 tons for the Panama-Pacific Exposition to Dyer Bros., San Francisco; 144 tons for a highway span near Nesika, Wash., and 114 tons for the Minnesota Steel Company, both placed with the American Bridge Company. The Rice Stix Drygoods Company building at St. Louis, which was figured for 1800 tons of steel, is to be built of reinforced concrete. Prices on fabricated steel are not receiving any great publicity, and the assumption that recent figuring has been very close is not greatly in error. Mill business in plain shapes is light and quotations on the basis of 1.40c., Pittsburgh, are more general. For Chicago delivery from mill we quote 1.58c. to 1.63c.

Local jobbers report that store orders for structural shapes show little falling off in number but that the current business represents a hand-to-mouth buying that is quite general. From store we quote for Chicago delivery 1.95c.

Plates.—The inquiry of the Chicago & Northwestern for 2500 cars is to be held in abeyance for at least 10 days. In the meantime the purchase of a number of small lots of cars is being quietly negotiated, and from orders placed with the mills it is estimated that close to 2500 cars have been so purchased. The general business in plates locally is restricted to carload lots, for which prompt delivery is being quoted. Buyers of plates state that 1.40c. is no longer the best price they are being offered. For Chicago delivery from mill we quote 1.58c. to 1.63c.

For Chicago delivery from warehouse we quote for plates 1.95c.

Sheets.—Sheet prices as developed in this market are approaching the level where local mills are considering a reduction of output. For black sheets 2.10c., Pittsburgh, and for galvanized sheets 3.10c. can be done on the regular run of business, while desirable orders are bringing out even more favorable quotations. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.78c.; No. 28 black, 2.33c.; No. 28 galvanized, 3.33c.

No change in the price of sheets out of store has been announced as yet and we continue to quote for Chicago delivery from store, No. 10 blue annealed, 2.15c.; No. 28 black, 2.75c.; No. 28 galvanized, 4c.

Bars.—A fair tonnage of inquiry for bar iron from the railroads developed the past week, but it served to whet rather than to satisfy competition, and prices based on 1.30c. at the mill are now far from being well established. Steel specifications are satisfactory, reports indicating that September tonnages exceeded those of August by about 10 per cent. We quote for mill shipment as follows: Bar iron, 1.30c. to 1.35c.; soft steel bars, 1.58c.; hard steel bars, 1.50c.; shafting in carloads, 60 per cent. off; less than carloads, 55 per cent. off.

For delivery from store we quote soft steel bars, 1.85c.; bar iron, 1.85c.; reinforcing bars, 1.85c. base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over, and usual card extras for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—Western mills have benefited by reason of an active buying of machine bolts by several of the railroads centering at St. Louis. In general, specifications against bolt contracts are rather light. The market on rivets continues demoralized. We quote from mill as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 75-10-7 $\frac{1}{2}$; cut thread, 75-12 $\frac{1}{2}$; larger sizes, 70-12 $\frac{1}{2}$; machine bolts up to $\frac{3}{8}$ x 4 in.,

rolled thread, 75-10-12½; cut thread, 75-10-7½; large size, 70-10-5; coach screws, 80-12½-5; hot pressed nuts, square head, \$6 off per cwt.; hexagon, \$6.70 off per cwt. Structural rivets, ¾ to 1¼ in., 1.98c. to 2.03c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Out of store we quote for structural rivets, 2.70c., and for boiler rivets, 2.90c. Machine bolts up to ¾ x 4 in., 70-5-10; larger sizes, 70-7½; carriage bolts up to ¾ x 6 in., 75-5; larger sizes, 70-7½ off. Hot pressed nuts, square head, \$5.50, and hexagon, \$6.20 off per cwt.

Wire Products.—While the tonnage bookings in plain wire and wire nails are very heavy, mill operations are rather at a slower rate, indicating that the actual movement of material is not yet fully under way. There are no evidences of any let up in the general strength of the situation. Prices to jobbers are as follows: Plain wire, No. 9 and coarser, base, \$1.63; wire nails, \$1.83; painted barb wire, \$1.83; galvanized, \$2.20; polished staples, \$1.83; galvanized, \$2.15, all Chicago.

Cast-Iron Pipe.—The past week brought out an improved tonnage of cast-iron pipe in this section, the awards including 1300 tons at Madison, Wis.; 200 tons at Kansas City, Kan.; 300 tons of high pressure pipe at Detroit, and 200 tons at Lennox, Iowa. Closing to-day, October 6, 600 tons of pipe will be awarded at Fairfield, Ill. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$28; 6 to 12 in., \$26; 16-in. and up, \$25, with \$1 extra for gas pipe.

Old Material.—The scrap market appears to be settling to the minimum level at which business can be done. In no direction are there indications of improved conditions. Among the interesting developments which the readjustments in price have brought about is a demand for No. 1 cast from melters who ordinarily use stove plate, the cast scrap being a desirable substitute at the present spread in prices. Further reductions in prices are noted for a number of grades of material. Offerings of scrap from the railroads in the past week included small lists from the Wabash and Frisco systems, 400 tons from the Baltimore & Ohio Chicago Terminal, 1600 tons from the Chicago, Milwaukee & St. Paul and 5000 tons from the Atchison, Topeka & Santa Fé, of which 1000 tons is No. 1 wrought and 500 tons No. 2 wrought. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$14.00 to \$14.50
Old steel rails, rerolling	12.25 to 12.75
Old steel rails, less than 3 ft.	11.25 to 11.75
Relaying rails, standard section, subject to inspection	24.00
Old carwheels	12.25 to 12.75
Heavy melting steel scrap	10.00 to 10.50
Frogs, switches and guards, cut apart	10.00 to 10.50
Shoveling steel	9.50 to 10.00
Steel axle turnings	7.25 to 7.75

Per Net Ton.	
Iron angles and splice bars	\$13.25 to \$13.75
Iron arch bars and transoms	13.25 to 13.75
Steel angle bars	9.25 to 9.75
Iron car axles	20.25 to 20.75
Steel car axles	14.50 to 15.00
No. 1 railroad wrought	9.75 to 10.25
No. 2 railroad wrought	9.00 to 9.50
Cut forge	9.00 to 9.50
Steel knuckles and couplers	9.75 to 10.25
Steel springs	9.75 to 10.25
Locomotive tires, smooth	11.00 to 11.50
Machine shop turnings	4.75 to 5.00
Cast and mixed borings	4.50 to 5.00
No. 1 busheling	8.50 to 9.00
No. 2 busheling	6.50 to 7.00
No. 1 boilers, cut to sheets and rings	7.00 to 7.50
Boiler punchings	10.25 to 10.75
No. 1 cast scrap	10.50 to 11.00
Stove plate and light cast scrap	9.50 to 10.00
Railroad malleable	9.75 to 10.25
Agricultural malleable	9.00 to 9.50
Pipes and flues	7.50 to 7.75

Philadelphia

PHILADELPHIA, PA., October 7, 1913.

Quieter conditions characterize practically every branch of the trade. In pig iron buying is closely confined to small transactions. Prices remain firm and unchanged, the tariff changes appearing to have no immediate bearing on the situation. Uncertainty as to the probability of importations in some classes of finished and semi-finished steel products keeps the trade guessing and developments are awaited. It is not believed likely that any importing movement will develop in plates or shapes, at least while domestic mills are anxious for business. Miscellaneous small lots, such as compose the bulk of the present business, would scarcely be brought in, owing to variations in specifications, covering sizes, weights, etc. Importations of steel billets are talked of, but there is a lack of definite

information. A large amount of ship building work is pending and railroad buying promises a wider range. There has been a further movement in furnace coke for last quarter. The old material market is distinctly easier; sales of heavy melting steel have been made at \$1 per ton under recent selling prices.

Iron Ore.—There has been no revival of interest in the market. Business is practically at a standstill. Importations during the week ended October 4 included 2200 tons from Venezuela and 13,100 tons from Cuba.

Pig Iron.—The removal of the duty on pig iron has had no material bearing on the market except that it has caused some hesitancy in negotiations in connection with forward buying. The placing of iron ore on the free list will not materially cheapen the cost of production, as but a small percentage of foreign ore is being used by merchant furnaces in this district. At present selling prices of domestic pig iron, the importation of foreign iron would be unprofitable, even in cargo lots, and buyers in cargo quantities are few. Cast-iron pipe makers in this vicinity might be interested, but at present prices abroad Middlesbrough No. 3 would cost more per ton than ordinary domestic grades delivered at Delaware River points. The general movement in the pig-iron market has, if anything, been slower. The larger consumers are awaiting developments, particularly when it comes to buying for forward account. Current sales have been principally in small lots for either prompt or near future delivery. A fair amount of buying for urgent immediate delivery continues. For ordinary small lots in the higher foundry grades transactions continue largely on the basis of \$16 to \$16.25, delivered here, for standard brands of eastern Pennsylvania No. 2 X foundry. At competitive points the inside quotation may, in instances, be shaded a few cents while a fair amount of business of a non-competitive character continues to be done at prices ranging up to \$16.50, delivered. In Virginia foundry moderate lots are being sold at the basis of \$13 at furnace for No. 2 X, with some special grades selling up to \$14. The volume of business is smaller. Low grade foundry iron is still being sought by cast-iron pipe makers in this district. Two melters would probably take up to an aggregate of 15,000 tons. Sales have not been heavy, owing principally to the scarcity of off grade irons. One lot of 1000 tons of forge was sold to a local pipe maker at \$15, delivered. Rolling mill forge iron has not been active; small lot sales have been made, however, at prices ranging from \$15 to \$15.25, delivered. A transaction involving 2000 tons of coke malleable, at \$16.90, delivered in this district, for first quarter shipment, has been closed. A moderate lot movement continues in the steel making grades. One lot of upward of 1000 tons of basic for immediate shipment in the Harrisburg district was sold at \$15.75, delivered. There is, however, little call for this grade and prices are largely nominal. A fair amount of inquiry for standard analysis low phosphorus iron is before the trade, but sales are mostly in small lots. Prices are comparatively firm for all grades, the following range representing the market for delivery in buyers' yards in this vicinity for the remainder of the year, with advances of 50c. a ton being named, in most grades, for early 1914 shipment:

Eastern Pennsylvania No. 2 X foundry	\$16.00 to \$16.25
Eastern Pennsylvania No. 2 plain	15.75 to 16.00
Virginia No. 2 X foundry	15.80 to 16.25
Virginia No. 2 plain	15.75 to 16.00
Gray forge	15.00 to 15.25
Basic	15.50 to 15.75
Standard low phosphorus	23.00 to 23.50

Ferroalloys.—Eighty per cent. ferromanganese is now being generally quoted at \$50, seaboard, which is the same price as quoted last week less the duty. Quite a number of small lot sales as well as a few 100-ton lots have been made on that basis for prompt shipment, but there has been little inquiry for forward delivery. Importations reported last week at this port aggregated 115 tons. There has been little movement in ferrosilicon.

Billets.—It is difficult to get any actual information regarding the importation of steel billets. While quotations of \$23, delivered here, have been heard, no business is reported. At the same time domestic makers are taking orders, mostly in small odd lots, at prices ranging from \$25 to \$25.50, delivered in this district, for ordinary basic open-hearth rolling billets. Some price adjustments are expected in the next few weeks, and meantime consumers are waiting developments. No doubt is expressed that good tonnage business

S. DIESCHER & SONS,
Mechanical and Civil Engineers,
PITTSBURGH, PA.

would develop lower prices, as domestic mills are anxious for business. Forging billets are nominally quoted at \$30 for ordinary analysis steel.

Plates.—Business continues on an irregular basis. Some mills are taking orders freely, although the demand is almost entirely confined to small miscellaneous lots. Few heavy specifications are coming to the mills. A large amount of business in ship plates is before the trade, but actual orders develop slowly. Plate makers do not expect to be seriously inconvenienced by tariff changes. On current business prices are pretty well maintained at 1.55c., delivered here, with some mills adhering pretty firmly to 1.60c. for that class of trade.

Structural Material.—New business of any importance develops slowly. Some fair building work is pending, and on large propositions concessions in prices are said to be available. Several building contracts involving a few hundred tons each have been closed. Some small bridges have been contracted for and more work of this character has come out. Plain shape orders coming to the mills have been small and mostly of a miscellaneous character. On this class of business prices continue to be held at 1.55c. to 1.60c. delivered here, but on large tonnage unconfirmed rumors are abroad that 1.50c. here has been done.

Sheets.—A very fair volume of day-to-day business has been coming out and Eastern mills have, in some instances, shown a gain on unfilled orders. Mill operations continue at full capacity. Western No. 10 blue annealed sheets are quoted at 1.75c. to 1.80c., delivered here, which prices are usually met by mills in the Eastern district.

Bars.—Current business in either iron or steel bars has been comparatively light. Orders are usually small and competition, particularly for iron bars, is sharper. General quotations for ordinary iron bars range from 1.25c. to 1.30c. at mill, equal to 1.32½c. to 1.37½c. delivered in this district. On the better grades up to 1.42½c. delivered is obtained. Steel bars, while reported weak, continue to be sold in moderate lots at 1.55c. here.

Coke.—A more active movement has developed in furnace coke for delivery over the remainder of the year. One transaction involved 30,000 tons, while several smaller sales were made. Standard furnace coke for fourth quarter shipment is now freely offered at \$2.25 at oven. Forward coke for 1914 delivery is still held at \$2.50 at oven, but no business is moving. Moderate sales of foundry coke continue to be made at \$3 to \$3.15 at oven. The following range of prices, per net ton, is named for delivery in buyer's yards in this vicinity:

Connellsville furnace coke	\$4.25 to \$4.65
Connellsville foundry coke	4.90 to 5.35
Mountain furnace coke	4.00 to 4.25
Mountain foundry coke	4.50 to 4.75

Old Materials.—Business, while spotty, has been more active with sales, as a rule, going at lower figures. Heavy melting steel sold off \$1 a ton as compared with recent transactions. A 2000-ton lot of No. 1 heavy melting steel was sold at \$11.50 delivered, and later round lot sales were made at \$11.25 and \$11, delivered. Heavy steel on the railroad lists was obtained by dealers at \$11.50. There is a general downward tendency in practically all of the active grades of old material. Rolling mill scrap is easier. Turnings are uncalled for, and car wheels have been moved, at lower prices. Consumers, when interested, appear to have little difficulty in obtaining material at prices below recent quotations. Prices are irregular and to a large extent nominal. An approximate range for delivery in buyers' yards in this district, covering eastern Pennsylvania, taking freight rates varying from 35c. to \$1.35 per gross ton, is as follows:

No. 1 heavy melting steel	\$11.00 to \$11.50
Old steel rails, rerolling (nominal)	14.50 to 15.00
Low phosphorus heavy melting steel scrap (nominal)	16.00
Old steel axles	18.50 to 19.00
Old iron axles (nominal)	25.00
Old iron rails	17.50 to 18.00
Old carwheels	12.50 to 13.00
No. 1 railroad wrought	14.00 to 14.50
Wrought-iron pipe	11.00 to 11.50
No. 1 forge fire	9.00 to 9.50
No. 2 light iron (nominal)	6.00
No. 2 busheling (nominal)	8.00 to 8.50
Wrought turnings	8.00 to 8.50
Cast borings	8.00 to 8.50
Machinery cast	13.50 to 14.00
Grate bars, railroad	10.00 to 10.50
Stove plate	10.00 to 10.50
Railroad malleable (nominal)	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, October 8, 1913.—(By Telegraph.)

Pig Iron.—The past seven days has probably been one of the duller periods experienced by iron merchants here in three years. Consumers in this territory are holding back, thus limiting the sales of foundry iron to small lots for immediate consumption. However, several large melters have recently contracted for supplies of both basic and foundry iron to cover them through the first half. The trouble with the present situation seems to be that the smaller consumers are tardy in signing up. The Southern price situation is as strong as previously reported, and the high cost of production in the Hanging Rock district would preclude any attempt to shade quotations there. The regular open quotation on Southern No. 2 foundry and soft is \$11.50, Birmingham basis, but No. 2 soft is hard to get and will easily bring a small premium over the regular foundry grade. First quarter orders are being taken at the above mentioned figure, but only a very small tonnage is involved in transactions already closed. Northern iron is unchanged at \$14, Ironton, for this year's shipment, and first quarter business has been booked at the same figure. The only large inquiries out include two from central Indiana, already reported, respectively for 4000 and 1000 tons of foundry grades. The Indiana manufacturer who is asking for 1000 tons of malleable will probably close this week. All of these are for first half shipment. A contract for 600 tons of Southern charcoal iron was signed this week by a Central Western manufacturer, the price being \$24, Birmingham, for January-June shipment. There is a trifle more activity in Ohio silvery irons. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton we quote f.o.b. Cincinnati as follows:

Southern coke, No. 1 foundry and 1 soft.....	\$14.75 to \$15.25
Southern coke, No. 2 foundry and 2 soft.....	14.25 to 14.75
Southern coke, No. 3 foundry.....	13.75 to 14.25
Southern, No. 4 foundry.....	13.25 to 13.50
Southern gray forge	12.75 to 13.25
Ohio silvery, 8 per cent. silicon.....	18.20 to 18.70
Southern Ohio coke, No. 1.....	16.20 to 16.70
Southern Ohio coke, No. 2.....	15.20 to 15.70
Southern Ohio coke, No. 3.....	14.95 to 15.45
Southern Ohio malleable Bessemer.....	15.20 to 15.45
Basic, Northern	15.20 to 15.45
Lake Superior charcoal	16.25 to 17.25
Standard Southern carwheel	27.25 to 27.75

(By Mail)

Coke.—It is reported that one large pig-iron operator in Ohio has closed for a fair-sized tonnage of furnace coke for first half shipment. It is understood that this coke will be shipped by Connellsville ovens, and while the price is not known it is understood to be below the \$2.50 quotation that has been ruling for several months. Standard Connellsville furnace brands are offered for either prompt or future shipment between \$2.25 and \$2.50 per net ton at oven. Wise County prices have also weakened, and, while the car shortage is a factor that has to be reckoned with, contract 48-hr. coke is obtainable as low as \$2.40 at oven, although as high as \$2.65 is asked for prompt shipment. In the Pocahontas field the situation is about the same, although the lowest open quotation is \$2.50 on furnace coke. Foundry grades average about the same in all three producing districts, \$3 per net ton at oven, although this can be shaded for several Connellsville 72-hr. brands. Domestic coke is in better demand.

Finished Material.—Reinforcing concrete bars and other kinds of structural steel are the best sellers just now. Local warehouses report quite a spurt in the demand in the past few days. While business is not up to what is considered a normal level, the showing for the past nine months has not been at all discouraging. This is especially gratifying, when the many retarding influences against the building trades are taken into consideration. However, the labor troubles that have been a great source of annoyance in this city are now all practically settled, and building operations are going ahead at full swing. The local mill reports an improvement in orders for both black and galvanized sheets, and it is still some six weeks behind in deliveries. No. 28 black sheets are quoted, in carload lots, at 2.20c. to 2.25c., and galvanized sheets at 3.25c. to 3.30c., Cincinnati.

Old Material.—There is no demand, and prices have weakened to the point where it is difficult to determine what the general quotations are. There are large yard stocks, and the offerings from railroads and other sources are above normal. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati.

and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.	
Bundled sheet scrap	\$7.00 to \$7.50
Old iron rails	12.00 to 12.50
Relaying rails, 50 lb. and up.....	19.75 to 20.25
Relaying steel rails	11.00 to 11.50
Melting steel rails	9.50 to 10.00
Old carwheels	10.75 to 11.25

Per Net Ton.	
No. 1 railroad wrought	\$9.00 to \$9.50
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.00
No. 1 cast scrap	9.00 to 9.50
Burnt scrap	6.50 to 7.00
Old iron axles	16.75 to 17.25
Locomotive tires (smooth inside).....	10.25 to 10.75
Pipes and flues	6.00 to 6.50
Malleable and steel scrap	7.50 to 8.00
Railroad tank and sheet scrap	4.75 to 5.25

Cleveland

CLEVELAND, OHIO, October 7, 1913.

Iron Ore.—Shipments of Lake Superior ore in September amounted to 7,258,413 tons, a decrease of 28,817 tons as compared with the movement of September, 1912. Shipments for the season until October 1 amounted to 39,265,484 tons, an increase of 2,927,102 tons over the movement to October 1, 1912. The falling off on shipments in September is attributed to the fact that some consumers have their storage yards well filled and asked that shipments be deferred. Last year shipments from October 1 until the closing of navigation aggregated 11,082,893 tons. If this record should be kept up this year the total lake movement for the year will be in excess of 50,000,000 tons. Shipments have been delayed considerably the last few days by severe weather. We quote prices as follows: Old range Bessemer, \$4.40; Mesaba Bessemer, \$4.15; old range non-Bessemer, \$3.50; Mesaba non-Bessemer, \$3.40.

Pig Iron.—The market is almost lifeless. Some small lot sales are reported for the last quarter delivery, but consumers are showing no interest as far as buying for delivery after the first of the year and producers are making no efforts to force sales. The demand for shipments on contract continues heavy and the consumption appears to be about equal to the production. Prices are unchanged and firm at \$14. Cleveland, for No. 2 for outside shipment, and \$14.50 at furnace for local delivery. In the Valley the \$14 price can probably be shaded for prompt shipment. Southern furnaces appear to be holding firmly at \$11.50, Birmingham, for No. 2 for prompt shipment and the last quarter. If there is any \$11 Southern iron left on the market it is claimed to be only a small tonnage of resale iron. For prompt shipment and for the last quarter we quote delivered, Cleveland, as follows:

Bessemer	\$16.65
Basic	14.90
Northern No. 2 foundry.....	\$14.65 to 15.00
Southern No. 2 foundry	15.35 to 15.85
Gray forge	14.25
Jackson County silvery, 8 per cent. silicon..	18.55 to 19.05

Coke.—The market is quiet. Furnace coke is being quite freely offered at \$2.25 per net ton at oven, but consumers claim that some of these makes can be bought as low as 2.15c. Considerable tonnage is reported to have been sold at 2.20c. Foundry coke is not active, the only demand being for small lots for spot shipment. The market is steady at \$3 for standard grades for prompt shipment and contract.

Finished Iron and Steel.—New demand is not active and is limited almost entirely to small lots for early delivery. Consumers are looking for lower prices and are buying only for their immediate necessities. Most consumers have good stocks on hand, but jobbers' stocks are reported low. Prices on plates and structural materials are weaker. Plates are now quite generally quoted at 1.40c., Pittsburgh, and some business is being taken at 1.35c. The regular quotation on structural material is still 1.45c. but sales are being made at 1.40c. In spite of the weakness in other lines, steel bars are firm at 1.40c., but the demand is very light and mills that did a premium spot shipment business and had few contracts during busy times are practically anxious for orders. The Upson Nut Company is running only three of its open-hearth furnaces or 60 per cent. of its capacity. The demand for iron bars is light and local mills are not meeting the 1.30c. price being made by Western mills. The Empire mill shut

down this week and part of the output of the Union mill is being rolled for stock. We quote bar iron at 1.40c., Cleveland. A better volume of structural work has come out. The McClintic-Marshall Construction Company has taken 1100 tons for a machine shop and other small buildings for the new plant of the Otis Steel Company and the American Bridge Company has taken 1000 tons for a hot metal bridge to be built by Corrigan, McKinney & Co. in connection with that firm's new steel plant. The American Bridge Company has also taken 140 tons for two bridges for the Toledo & Ohio Central Railroad and was low bidder for 800 tons for the Taylor store addition in Cleveland, the general contract for which has been awarded to the George A. Fuller Company. The Great Lakes Engineering Works is reported to have an order for a boat for the coast trade, the size and purchasers' identity not yet being known. A fair amount of new business has come out in sheets. While the market is very weak, no lower prices are reported that have been quoted recently. Minimum quotations are 2.05c. for No. 28 black, 3.10c. for No. 28 galvanized and 1.60c. for No. 10 blue annealed. Warehouse prices are unchanged at 2c. for steel bars and 2.10c. for plates and structural material.

Old Material.—Heavy steel scrap has declined 50c. a ton and lower quotations are being made on several other grades. Railroad scrap sold during the week brought very low prices. The supply is much larger than the demand. Dealers expect a further decline in prices in the next week or two and are not stocking up. A local steel plant is offering \$10.50 for heavy melting steel. The shutting down of one of the Cleveland rolling mills has the tendency of further depressing the market. We quote f.o.b. Cleveland as follows:

Per Gross Ton.	
Old steel rails, rerolling	\$13.00 to \$13.50
Old iron rails	14.00
Steel car axles	17.00 to 17.50
Heavy melting steel	10.50 to 10.75
Old carwheels	12.00 to 12.50
Relaying rails, 50 lb. and over.....	23.00 to 25.00
Agricultural malleable	9.50 to 10.00
Railroad malleable	11.00 to 11.50
Light bundled sheet scrap	7.50 to 8.00
Bundled tin scrap	11.00 to 11.50

Per Net Ton.	
Iron car axles	\$20.00 to \$21.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings.....	4.50 to 4.75
Steel axle turnings	7.00 to 7.50
No. 1 busheling	10.00 to 10.25
No. 1 railroad wrought	10.50 to 11.00
No. 1 cast	11.00 to 11.50
Stove plate	8.50 to 8.75

German Mills Discharging Workmen

Reduced Steel Prices Do Not Stimulate
Buying—Plate Market Grows Worse

BERLIN, September 25, 1913.

Business is still growing worse. Hitherto it had only been mentioned that some of the mills were running on shorter hours, but this week several cases have been reported where labor has been discharged owing to lack of orders. The Schulz-Knautt plate mill at Hückingen (lower Rhine region) has discharged a number of its men and shut down a part of its plant and the Hahnsche Werke (tube maker) has also just dismissed a part of its working force. Other mills, chiefly such as have to buy their steel, have taken similar steps. The unfavorableness of the market position is further reflected in reports, indicating that the mills are exerting themselves more than ever to secure new orders. As matters now look, more extensive restrictions of production will have to be carried out before the end of the year, unless a better run of orders soon begins to come in.

Pig-Iron Market Less Satisfactory

No indications are as yet seen of any restriction in production, but calls for shipment of iron are growing less satisfactory from week to week. New orders are, of course, coming in very slowly, the home trade having some time ago provided for its requirements for the rest of the year, and the export demand is falling off. The ore market is quiet, but mines fully maintain their previous rate of production. From the Luxemburg-Lorraine district it is reported that the demand for silicious minettes is steadily increasing, and buyers' offers for next year's shipment are at somewhat higher prices. A deposit of manganese ore—of which Germany produces only a few hundred tons, while its imports in 1912 were 500,000 tons—has been discovered

at Messinghausen, in the semi-mountainous eastern part of Westphalia, and a company has begun to exploit it. It is not yet known how the deposit will show up as the mine is opened.

Various Steel Products in Less Demand

Business in semi-finished steel continues unsatisfactory. The big producers of the Union are making steel chiefly for their own consumption in turning out the more finished products. The demand for beams is light, but structural shapes for construction shops are in pretty good demand, these shops being still well employed.

The plate market is still growing worse. The latest prices reported are 102 to 104 marks (\$24.28 to \$24.75) a ton for heavy plates. The latest drop was evidently hastened by the reduction in semi-finished steel of 5 marks (\$1.19) last week. It is regarded as probable that heavy plates will go even lower. Thin plates command 118 to 120 marks (\$28.08 to \$28.56), with a higher level for specially popular qualities. The demand for all grades of plates is light, which is felt the more keenly in view of the heavy increase in producing capacity within a few months.

The tube market has latterly grown decidedly worse, owing to the fact that the two big groups of producers are at open war. Within three weeks the price of gas pipes has been reduced 15 marks (\$3.57) per ton.

It is regarded as probable that the Wire Rod Association will reduce prices next week several marks a ton, owing to the reduction in steel material. The association of dealers in commercial screws has just raised rebates on an average between 2 and 5 per cent., in a few cases as much as 10 per cent.

Manufacturers in the Rhenish-Westphalian district have apparently not reduced steel-bar prices below those quoted in last week's letter, but several of the biggest companies in Lorraine, lying near the French border, are reported as selling them as low as 89 to 90 marks (\$21.18 to \$21.42). The export price of plain drawn wire has been reduced 25 pfennigs (6c.) per metric cwt.; the new price is 12.25 marks (\$2.92), f.o.b. Antwerp, subject to 3 per cent. discount.

Reduced Prices Do Not Stimulate Buying

There are as yet no indications that the reduction in prices of semi-finished steel and beams by the Union has given any stimulus to buying. The manufacturers of finished products operating on bought material say that the reduction is not sufficient to do justice to their trade position, and that still lower prices must be given them. The prospects for the future, however, are judged more favorably in some sections of the trade. It is expected that the money market, notwithstanding the continued high interest rates, must soon show a considerable relaxation. This must certainly come, if not in the next two months, then in the early months of next year; and then a good revival in the building trade with a correspondingly increased demand for structural steel, is looked for.

At a meeting of machine-tool manufacturers at Düsseldorf several days ago it was given out that the shops are satisfactorily employed and still have orders on hand for some time ahead. Ordering has become somewhat more slack, but the belief is expressed that the demand will increase as soon as money conditions improve.

The Laura-Hütte, the principal company of the Silesian district, has just announced a dividend of 8 per cent., as against 6 per cent. for last year. The de Wendel interests at Hayingen, near the French frontier, have acquired a rolling mill at Messempré, in France. This concern and also the great Burbach combination will erect coke ovens, using Lorraine coal; they wish to render themselves independent of the Coal Syndicate.

Other Continental Markets

The tendency of the Belgian market has been unfavorably affected by the reductions made by the German Steel Works Union. Bands for export have been reduced to 125 to 126s. (\$30.42 to \$30.66), and thin plates to 113 to 114s. (\$27.49 to \$27.74). According to a Brussels dispatch of today the International Beam Cartel has begun to take orders for the fourth quarter at the unchanged price of 111s. (\$27.01) f.o.b. Antwerp.

It transpires that the reductions made in the Austrian trade last week were considerably greater and more general than had been expected. Practically all grades were reduced. The cuts range between 20 and 50c. a ton. Besides the reduction made last week in Germany, the Austrian Iron Cartel is having troubles at home which make reductions necessary, as there are

two independent concerns in Bohemia that are competing sharply with it in bars. The reports from the Austrian trade are cast in an extremely despondent tone.

British Markets Under German Hammer

Cutting by Germans to Get Orders—
The Tendency All Round Seems Downward

(By Cable.)

LONDON, ENGLAND, October 8, 1913.

No interest is being taken in the iron and steel markets. Pig iron shows a drooping tendency. The quarterly meeting of the trade in Birmingham on Thursday may perhaps give a lead. The position is mainly depressed by acute German conditions and furious cutting of prices to get orders. The tendency all round seems downward, but the fall in Continental steel cannot recede much further. Stocks of pig iron in Connal's stores are now 170,045 gross tons, against 174,111 tons a week ago. We quote as follows:

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb. f.o.b. Wales, 13s. 1½d. (\$3.19).

(The following prices are per ton of 2240 lb.):

Cleveland pig-iron warrants (Tuesday), 53s. 1d. (\$12.91), against 54s. 4½d. (\$13.25) a week ago.

No. 3 Cleveland pig iron, makers' price f.o.b. Middlesbrough, 54s. (\$13.14), against 55s. (\$13.38) a week ago. Ferromanganese, £9 17s. 3d. (\$48).

Steel sheet bars (Welsh), delivered at works in Swansea Valley, £4 15s. (\$23.11).

Steel bars, export, f.o.b. Clyde, £6 10s. (\$31.63).

Steel joists, 15-in., export f.o.b. Hull or Grimsby, £5 17s. 6d. (\$28.59).

Steel ship plates, Scotch, delivered local yards, £7 7s. 6d. (\$35.89).

Steel black sheets, No. 28, export f.o.b. Liverpool, £9 5s. (\$45.02).

Steel rails, export, f.o.b. works port, £6 7s. 6d. (\$31.02).

(The following prices are per export ton of 1015 kilos, equivalent to 2237.669 lb.):

German sheet bars, f.o.b. Antwerp, 87s. 6d. (\$21.29).

German 2-in. billets, f.o.b. Antwerp, 80s. (\$19.46).

German basic steel bars, f.o.b. Antwerp, £4 12s. (\$22.38).

German joists, f.o.b. Antwerp, £5 8s. to £5 11s. (\$26.28 to \$27.01).

Birmingham

BIRMINGHAM, ALA., October 6, 1913.

Pig Iron.—There has been less business in this market recently, but apparently the sales of at least one large interest have been equal to the make. Shipments are in excess of the Alabama output, owing to the insistent demand for iron ordered. In spite of repeated reports of sales of round lots of Alabama iron at \$11.75 for 1914 delivery, no such actual transactions can be located, and there are no iron-making concerns here claiming to have done that business. Such sales as are being made are still on the \$11.50 basis, with nothing apparently under that and nothing above it. The companies holding 1914 iron at \$12 have not made sales that are known of, with the exception of some special or analysis iron. Dealers confirm what the makers say. They report quite a number of carload and other small sales on the uniform basis of \$11.50. An exception was the booking of some No. 1 at \$12.50 and some No. 2 at \$11.75 by a brokerage firm. Lower grades continue scarce, and there is still no difference between gray forge and No. 4 in actual transactions. We quote, per gross ton, f.o.b. Birmingham district furnaces (the first figure representing the general market and the latter scattering sales) as follows:

No. 1 foundry and soft.....	\$12.00 to \$12.50
No. 2 foundry and soft.....	11.50 to 11.75
No. 3 foundry.....	11.00 to 11.25
No. 4 foundry.....	10.75 to 11.00
Gray forge.....	10.50 to 10.75
Basic.....	11.50 to 11.75
Charcoal.....	24.50 to 25.00

Coal and Coke.—The good grades of domestic coal are bringing higher prices, due to the approach of cold weather, but steam coal prices remain the same. The

John P. Harrison Company, of London, ship owner, has ordered 30,000 tons of coal from the Tennessee Company for the use of its ships at Mobile and other Southern ports—the first order placed in this section, all bunker coal having heretofore been taken at Norfolk and other points. The Alabama Power Company also placed a large order. Most mines are busy. Coke has been quieter, but prices have not fallen. Some Virginia coke has passed through Birmingham for Texas points, but none has invaded Alabama. Furnace coke is quoted, per net ton at oven, at \$3 to \$3.50 and foundry coke at \$3.75 to \$4.25.

Cast-Iron Pipe.—The United States Cast Iron Pipe & Foundry Company has received an order for 1000 tons of 30-in. high-pressure pipe for the Canal Zone and the order is being filled at its Anniston plant. Horace Hammond, of the Gadsden Pipe Works, has gone to Cuba, where it is understood he expects to secure a large soil pipe order. No special change is reported in the status of the pipe trade and quotations remain the same, as follows, per net ton: 4-in., \$22; 6-in. and upward, \$20, with \$1 added for gas pipe.

Old Material.—Scrap is stronger and more active. There is a considerable movement of heavy machinery and stove plate, together with several other grades. The old material men report improved prospects. The week's movements aggregated 2000 tons. Prices, per gross ton, f.o.b. dealers' yards, are as follows:

Old iron axles (light)	\$15.00 to \$15.50
Old steel axles (light)	15.00 to 15.50
Old iron rails	12.50 to 13.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	10.00 to 10.50
No. 1 country wrought	9.50 to 10.00
No. 2 country wrought	8.50 to 9.00
No. 1 machinery cast	10.00 to 10.50
No. 1 steel scrap	10.50 to 11.00
Tram carwheels	10.50 to 11.00
Standard carwheels	12.00 to 12.50
Light cast and stove plate	8.50 to 9.00

St. Louis

ST. LOUIS, Mo., October 6, 1913.

With buyers unwilling to commit themselves far in advance and sellers disinclined to accept present figures for long periods ahead the natural result has been a somewhat quiet week.

Pig Iron.—The demand is chiefly for immediate wants. Foundrymen seem to believe that present figures will not prevail, while furnace representatives are stiff at the quoted prices and are under instructions not to encourage buying even for the first quarter. Sales for the week were nearly all of small lots, but the aggregate was fairly satisfactory. Included in the larger sales was one of 750 tons and one of 500 tons of No. 2 Southern, also 1000 tons of malleable previously agreed on, together with several of 200 tons, 175 tons, 150 tons and 100 tons. There was considerable movement in special analysis Northern iron, the aggregate being understood to run somewhere between 5000 and 10,000 tons, but details were withheld. Inquiries in the market are not numerous, leaving very little business hanging over and indicating that consumption is practically up to purchases. No. 2 Southern is firm at \$11.50 in this market for last and first quarters and \$12 for first half, Birmingham basis. Ohio iron is \$14 to \$14.50, Iron-ton basis, and Chicago No. 2 X \$15 at furnace for No. 2 foundry, basic and malleable.

Coke.—There was some little activity and quite a number of sales of small lots at stiffened prices. The largest transaction of the week was in furnace coke, the St. Joe Lead Company taking about 15,000 tons for the coming six months, divided between Stonega and Roda. A late sale was of 2500 tons of foundry coke, the price on which was withheld. By-product continues to sell on the Connellsville basis.

Finished Iron and Steel.—There has been very little activity save in the pushing forward of requirements under existing contracts. In structural materials the fabricators report themselves still fairly busy, with prospects of still further business coming out of the architects' offices. They express the belief that business is being banked up to await possible changes in market conditions. In bars all business now being placed is for quick shipment and the information at hand shows that stocks are light and that buyers are buying only as they have to. Plates are the weak spot in this section of the market and very little is doing. Railroad offices indicate on inquiry that they are likely to be very conservative for the immediate future as to their purchases of standard rails. In light

rails there has been some little movement on account of the needs of the coal interests. Track fastenings are in only fair request.

Old Material.—Quotations are made really from the nominal viewpoint as transactions are altogether on the basis of the needs of the moment. The mills and foundries in some cases are taking on their contracts, but are, apparently, not particularly interested in new buying and even pay very little attention to attractive bargains, because most of them have their yards pretty well filled up. Dealers are beginning to complain of refusals of consumers to take material even after ordered because of the condition of yards, one large concern in particular having taken this position. As far as real business is concerned the only transactions of consequence are those of dealers who are taking scrap at panic prices because of their financial ability to carry it in yards for a time and still make money. The expectations of new railroad lists make the situation worse. The list out so far include the Wabash with 1100 tons and the Mobile & Ohio. Still others are to come during the week. Prices as quoted are f.o.b. St. Louis by dealers, and delivered at local mills would be about 50 cents higher.

Per Gross Ton.	
Old iron rails	\$10.50 to \$11.00
Old steel rails, re-rolling	11.00 to 11.50
Old steel rails, less than 3 ft.	9.00 to 9.50
Relaying rails, standard section, subject to inspection	23.00 to 24.00
Old carwheels	10.00 to 10.50
Heavy melting steel scrap	8.75 to 9.25
Shoveling steel	8.00 to 8.50
Frogs, switches and guards cut apart	8.50 to 9.00

Per Net Ton.	
Iron angle bars	\$10.00 to \$10.50
Steel angle bars	7.50 to 8.00
Iron car axles	17.50 to 18.00
Steel car axles	13.50 to 14.00
Wrought arch bars and transoms	11.50 to 12.00
No. 1 railroad wrought	8.75 to 9.25
No. 2 railroad wrought	8.00 to 8.50
Railroad springs	7.50 to 8.00
Steel couplers and knuckles	7.50 to 8.00
Locomotive tires, smooth	9.50 to 10.00
No. 1 dealers' forge	8.00 to 8.50
Mixed borings	3.50 to 4.00
No. 1 busheling	7.50 to 8.00
No. 1 boilers, cut to sheets and rings	4.50 to 5.00
No. 1 cast scrap	8.50 to 9.00
Stove plate and light cast scrap	6.50 to 7.00
Railroad malleable	7.50 to 8.00
Agricultural malleable	6.00 to 6.50
Pipes and flues	3.50 to 4.00
Railroad sheet and tank scrap	4.50 to 5.00
Railroad grate bars	6.00 to 6.50
Machine shop turnings	4.00 to 4.50
Bundled sheet scrap	3.50 to 4.00

Buffalo

BUFFALO, N. Y., October 7, 1913.

Pig Iron.—About 10,000 tons in small and moderate-sized lots of foundry grades have been placed, principally for current and fourth-quarter consumption. Most buyers are still holding off for forward delivery, waiting to determine the effect of the new tariff, with the expectation apparently of some advantage. A number of consumers have made offers to furnaces based on their conception of market changes that should result, but furnacemen with great unanimity are holding firmly to quoted schedules. Pressure for shipments on existing contracts both by canal and rail has been a pronounced feature. We quote as follows for fourth-quarter delivery f.o.b. furnace:

No. 1 foundry	\$14.25 to \$15.00
No. 2 X foundry	14.00 to 14.50
No. 2 plain	14.00
No. 3 foundry	13.75 to 14.00
Gray forge	13.75
Malleable	14.00 to 14.50
Basic	14.50 to 14.75
Charcoal, regular brands	15.50 to 16.50
Charcoal, special brands and analysis	17.00 to 19.50

Finished Iron and Steel.—Inquiry has been of fair volume in bar material with a good flow of orders from users who require prompt delivery. Prices are firmly held at 1.40c. base, Pittsburgh. Demand in plates is a little lower, some business being done at 1.40c. The price for shapes holds at 1.45c. Specification on contracts has been of normal volume and no cancellations are reported, although there have been a few requests for extensions or spreading out of deliveries. In wire and wire products specification has been of good volume and new business has been heavy. Business has been placed at the market for delivery as far as six months ahead. There is no weakness in any line of wire products, \$1.65 for nails and \$1.45 for wire being firmly maintained. September has proved a record month for tonnage placed in these

commodities for the Buffalo district. On the Canadian side of the border the improved financial situation has led to forward contracts in considerable volume. Large contracts for galvanized fence wire have been closed for with Canadian woven wire fence companies for delivery this year and the first half of next. Large business in wire rods has also been made for the first half of the year, buyers believing that bottom has been reached on both products. The Dominion Dredge Company has placed contract with the Dominion Iron & Steel Company for 5500 tons of reinforcing bars for use in connection with the Welland Canal enlargement, and it has also placed orders for considerable structural material and some steel sheet piling. It is understood that the Polson Iron Works, Ltd., will build a government boat requiring about 1000 tons of plates, though owing to governmental restrictions this tonnage will probably have to be placed abroad. Local reports state that 200 tons reinforcing bars for a new hotel in Buffalo have been closed. In fabricated structural lines a good deal of new work is coming up for bids. Figures were taken this week for a loft building for the Buffalo Maintenance Company, 200 tons, also for a bottling house for the Phoenix Brewery, 100 tons. Bids will be received next week for public school No. 42, 100 tons, and for a parochial school for the Church of the Holy Name, 120 tons, architects, Cyrus K. Porter & Sons. Bids will be taken October 15 for 300 tons for the Binghamton, N. Y., high school. Architect Carl Schmill, Buffalo, will receive bids in about 30 days for a convent, church and school for the Felician Sisters, Lodi, N. J., requiring 500 tons. The Buffalo Structural Steel Company has contracts for two sub-exchange buildings for the New York Telephone Company, one at Buffalo and one at Niagara Falls, 100 tons each, and for a foundry building for the American Bronze Company, Buffalo, and the Progressive Steel Company for steel for a laundry building and a boiler house for the St. Mary's Deaf Mute Institution, Buffalo.

Old Material.—The general market is dull and quiet. The principal business transacted was in borings and turnings, with some interest shown in cast scrap by local consumers. Some purchases have been made in the Buffalo district by Pittsburgh consumers of heavy melting steel. Prices remain unchanged. We quote as follows per gross ton f.o.b. Buffalo:

Heavy melting steel	\$10.50 to \$11.00
Boiler plate, sheared	12.50 to 13.25
Bundled sheet scrap	8.00 to 8.50
No. 1 busheling scrap	10.50 to 11.00
No. 2 busheling scrap	8.00 to 8.50
Low phosphorus steel scrap	16.50 to 17.00
Iron rails	15.00 to 15.50
No. 1 railroad wrought	13.00 to 13.50
No. 1 railroad and machinery cast scrap	13.00 to 13.50
Steel axles	17.00 to 17.50
Iron axles	22.50 to 23.00
Carwheels	12.50 to 13.00
Railroad malleable	12.00 to 12.50
Locomotive grate bars	10.00 to 10.50
Stove plate (net ton)	9.75 to 10.00
Wrought pipe	9.50 to 10.00
Machine turnings	6.00 to 6.50
Heavy steel axle turnings	8.00 to 8.75
Clean cast borings	6.25 to 6.75
Bundled tin scrap	14.00

Boston

BOSTON, MASS., October 7, 1913.

Old Material.—The trade is not encouraged by the prospect. Dealers report the market weaker. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices.

Heavy melting steel	\$9.00 to \$9.25
Low phosphorus steel	13.75 to 14.75
Old steel axles	13.75 to 14.75
Old iron axles	21.25 to 21.75
Mixed shafting	13.25 to 13.50
No. 1 wrought and soft steel	10.75 to 11.00
Skeleton (bundled)	7.75 to 8.25
Wrought-iron pipe	8.75 to 9.25
Cotton ties (bundled)	8.75 to 9.25
No. 2 light	3.75 to 4.25
Wrought turnings	5.50 to 5.75
Cast borings	5.50 to 5.75
Machinery, cast	11.75 to 12.25
Malleable	10.25 to 10.75
Stove plate	8.00 to 8.50
Grate bars	7.00 to 7.25
Cast-iron carwheels	13.75 to 14.25

New York

NEW YORK, October 8, 1913.

Pig Iron.—It is a dull market and it has grown quieter in the past week. Producers of pig iron have felt that if the improvement their industry has shown on its own initiative could now be reinforced by a better demand for steel products there would be no difficulty in carrying farther the slight advance in pig iron that has come since early August. But the tendency in finished products is not for the better, and this condition has raised some question as to the maintenance of the present level for pig iron. However, transactions have not been in volume sufficient to cause any real test. Very little buying has been done for 1914, and what there is is chiefly on contracts combining shipment in the last quarter and in part or all of the first quarter. No large inquiries are up in the Eastern market apart from pipe iron. In the past week it is doubtful if any actual sale of foundry iron has gone over 400 or 500 tons. We quote Northern iron for tidewater delivery as follows: No. 1 foundry, \$16 to \$16.25; No. 2 X, \$15.75 to \$16; No. 2 plain, \$15.50 to \$15.75. Southern iron is quoted at \$15.75 to \$16.25 for No. 1 foundry and \$15.25 to \$15.75 for No. 2.

Shapes and Plates.—The uncertainties of the effect of the tariff reductions are admitted now as an important factor contributing to the present hesitation to enter on new projects, and the price question is prominent in deliberations, though as yet commitments have not been heavy. There is weakness among the mills, owing to the small amounts of bookings ahead of the rolling schedules, with resultant shading of prices, but fresh evidence is at hand with regard to the underlying strong situation in the need of material. More than one purchasing agent of railroads, for example, has large piles of requisitions against which purchases are held off as long as possible. The closing of an order seems now in most cases to hinge on the question of price. The larger buyers of plain material have been able to secure 1.35c. base Pittsburgh, though most of the new business, the total volume of course not very great, is going at 1.40c. and even 1.45c. Pittsburgh. Only in the case of the very largest users, whose specifications call for large tonnages of a few sizes in both shapes and plates, has the material been closed for 1.30c., Pittsburgh. In the East universal plates are, if anything, firmer than the sheared plates, but locally the plate market is all for individually small orders. In structural material 5000 tons for the Baltimore & Ohio; 300 tons for a school building in Binghamton, N. Y., and 600 tons for a bridge over the Passaic river are mentioned. Awards have been reported for the Girard high school, Philadelphia, 300 tons; for a power house for the Norfolk & Western, 500 tons to the Phoenix Bridge Company; an apartment house on Eighty-fifth street and West End avenue, 350 tons, to Ravitch Brothers; for bridge work for the New York, New Haven & Hartford, 500 tons, to Lewis F. Shoemaker & Co.; for six bridges for the Boston & Albany, 750 tons, to the Pennsylvania Steel Company, and for piersheds at Providence, R. I., 1000 tons, to the McClintic-Marshall Construction Company. Some 1100 tons for the Palmerton works of the New Jersey Zinc Company for a trestle, appears not yet definitely settled. As regards movements from warehouse, there seems to be some softness, though most jobbers are adhering to the recent or higher quotations here given. We quote mill shipments of plain structural material and plates at 1.35c. to 1.40c., Pittsburgh, or 1.51c. to 1.56c., New York, and from store 2c. to 2.10c.

Iron and Steel Bars.—Steel bars are still showing to a surprising extent their present independence of the rest of the finished material market. They still remain firm with round orders still far from very definite rolling schedules. Large buyers are holding off, apparently until an expected decline, which has not occurred with the drop in other lines. The concurrent weakness is noted, for example, in the sale of 50 tons of shafting at a discount of 63 per cent. Bolts, spikes and pipe are reported weak, with concessions from usual discounts. The situation in bar iron is also singular. By some mills bar iron prices have been held steadily for some time, while there has been a gradual drop made by other mills. It appears that the top prices are those of the larger mills, which have not only had a good volume of business, but have obtained it partly as a result of the wide scope of size and products which they can cover, while the weakness has developed with those mills circumscribed as regards

range of output and forced to make concessions to get desirable business in their special shapes and sizes. Having in mind the mixed situation in jobbing prices and with the foregoing explanation as regards bar iron, we quote mill shipments of steel bars at 1.40c., Pittsburgh, or 1.56c. New York, and from store 1.95c. to 2.05c.; and mill shipments of bar iron at 1.35c. to 1.50c., New York, and from store 2c. to 2.10c.

Ferroalloys.—The removal of the duty of \$2.50 per ton on ferromanganese by the passage of the new tariff bill has fixed the price of 80 per cent. at \$50 per ton, Baltimore. At this level there have been a number of sales of small lots and the price has been firm, but the general market is dull. Rumors of weakness in the price of ferrosilicon could not be verified and quotations remain at \$75, Pittsburgh, for carloads; \$74 per 100 tons and \$73 for 600 tons and over.

Cast-Iron Pipe.—Inquiry from private buyers has decidedly improved this week. Public lettings, however, are still few, the only one of importance in this territory being 500 tons for Fall River, Mass., on which bids will be opened today. Carload lots of 6 in. are quotable at \$23 to \$23.50 per net ton, tidewater, New York.

Old Material.—Railroad lists this month have been quite heavy, but the offerings appear to have been taken either by consumers or dealers. It is understood, however, that dealers who bid for any considerable quantity are finding it difficult to dispose of what they have secured and are unable to give shipping instructions to the railroads. The situation is most unsatisfactory to dealers, as consumers are not only averse to making fresh purchases, but are free in their rejections of deliveries on contracts. With practically no transactions coming to light, market prices are difficult to state definitely. While dealers' quotations are as follows, per gross ton, New York, it would not be surprising if some grades of material could be had at prices considerably lower than those given:

Old girder and T rails for melting.....	\$8.75 to	\$9.25
Heavy melting steel scrap	8.75 to	9.25
Relaying rails	21.00 to	21.50
Rerolling rails	12.50 to	13.00
Iron car axles	22.00 to	22.50
Steel car axles	16.00 to	16.50
No. 1 railroad wrought.....	12.00 to	12.50
Wrought-iron track scrap	11.00 to	11.50
No. 1 yard wrought long.....	10.00 to	10.50
No. 1 yard wrought, short.....	9.50 to	10.00
Light iron	3.50 to	4.00
Cast borings	5.00 to	5.50
Wrought turnings	5.00 to	5.50
Wrought pipe	8.50 to	9.00
Carwheels	11.50 to	12.00
No. 1 heavy cast, broken up.....	11.00 to	11.50
Stove plate	8.50 to	9.00
Locomotive grate bars	7.50 to	8.00
Malleable cast	9.00 to	9.50

Metal Market

NEW YORK, October 8, 1913.

The Week's Prices

Cents Per Pound for Early Delivery

Copper, New York.		Tin,		Lead—		Spelter—	
Oct.	Lake.	Electro-lytic.	New York.	New York.	St. Louis.	New York.	St. Louis.
1.....	16.87½	16.75	41.00	4.60	4.45	5.60	5.45
2.....	16.87½	16.75	40.70	4.57½	4.42½	5.55	5.40
3.....	16.87½	16.75	.....	4.57½	4.42½	5.55	5.40
4.....	16.87½	16.75	.....	4.57½	4.42½	5.50	5.35
5.....	16.87½	16.62½	40.40	4.57½	4.42½	5.45	5.30
6.....	16.87½	16.50	40.45	4.57½	4.42½	5.45	5.30
7.....	16.87½	16.50	40.80	4.57½	4.42½	5.45	5.30
8.....	16.87½	16.50	40.80	4.57½	4.42½	5.45	5.30

Copper is dull at nominal prices. Tin, in small demand, has been subject to slight fluctuations. Lead is lower and the demand a trifle better though the market is still quiet. Spelter has declined under pressure to sell and little business. Antimony has been reduced, but new demand is light.

New York

Copper.—The market has been dull. Consumers seem to be busy and are using fair quantities, but their wants are covered for the present and those of a few weeks to come. Their temper is such that they do not care to buy beyond November. In copper as in other metals and lines there exists the tendency to await the working out of the new tariff. The indisposition to buy and the fact that consumers are covered were exemplified by an offering of a carload of copper this last week. The invariable reply of those approached indicated the situation described. In the absence of demand and the nominal state of the market, holders of resale copper have been adjusting their prices in accordance with quotations abroad which accounts for the advance in the latter part of last week. Lake copper, which is particularly quiet, is quoted at 16.87½c. to

17.12½c. and electrolytic is quoted in limited quantities at 16.50c., cash, or 16.62½c., delivered 30 days. Quotations in London to-day were £73 2s. 6d. for spot and £73 for futures. Exports this month total 5054 tons.

Copper Averages.—The Waterbury average for September was 16.87½c. The average New York price for Lake, based on daily quotations in *The Iron Age*, was 16.77½c., and for electrolytic, 16.58½c.

Pig Tin.—Consumers have done no buying except in small quantities for pressing needs and quick delivery and the result has been a dull market. The general run of users are well supplied for the moment and do not appear to be worrying about the future. They are indifferent and if they are induced to buy, sacrifices of from ½c. to ¾c. must be made by the sellers. The metal is quoted to-day at 40.80c. in New York. The London quotation is £186 10s. for spot and £187 for futures. The arrivals this month total 595 tons and there is afloat 3020 tons.

Lead.—The American Smelting & Refining Company on October 1 reduced its price 15c. per 100 lb. to 4.60c., New York, and 4.45c., St. Louis. This was expected in view of the fact that outsiders had persistently undersold. This they have continued to do and the independent quotations to-day are 4.57½c., New York, and 4.42½c., St. Louis. In the West there has been more pressure to sell than in the East. Local demand has improved a trifle in the past week, but not nearly enough to take up the outside lots.

Spelter.—The trend of prices has been downward and the quotations to-day are 5.45c., New York, and 5.30c., St. Louis, with the market weak at those figures. The desire to sell is greater than the desire to buy. Because of the decline in spelter the base price of sheet zinc in carload lots has been reduced 25c. per 100 lb. to \$7.75 per 100 lb. basis, less 8 per cent. discount, f.o.b. cars Peru, Ill.

Antimony.—The market is in an unsettled state and probably will be for some time because of the large quantities of antimony which had accumulated in bond pending the enactment of the new tariff. Efforts will be made to force the sale of much of this metal which is now subject to a duty of 10 per cent. ad valorem instead of 1½c. per lb. as heretofore. The question of duty is not altogether clear, as the duty is not necessarily figured on the invoice price but on the value at the point of origin on the date of shipment. Since the enactment of the new tariff more metal has been withdrawn from bonded warehouses than for many weeks. Quotations are: Hallett's, 7.25c. to 7.50c.; Cookson's, 7.50c. to 7.60c.; Chinese and Hungarian, 6.50c. to 6.75c.

Old Metals.—Quiet conditions prevail but dealers' selling prices are unchanged as follows:

	Cents per lb.
Copper, heavy and crucible.....	15.75 to 16.25
Copper, heavy and wire	15.25 to 15.50
Copper, light and bottoms	13.75 to 14.25
Brass, heavy	10.25 to 10.75
Brass, light	8.75 to 9.00
Heavy machine composition	14.00 to 14.25
Clean brass turnings	9.50 to 9.75
Composition turnings	12.00 to 12.50
Lead, heavy	4.50
Lead, tea	4.25
Zinc scrap	4.50

Chicago

OCTOBER 6.—Liberal buying of copper for early delivery is noted, but the uncertainty as to future copper is holding prices in check and quotations are unchanged from those of a week ago. The leading interest has reduced its quotations on lead \$3 a ton to meet concessions that have been generally current. Spelter prices are also easier. The effect of the tariff has not yet manifested itself in prices. For old metals the dealers are bidding less actively and it is more difficult to secure top prices for scrap. We quote as follows: Casting copper, 16.75c.; Lake, 17c. to 17.25c., for prompt shipment; small lots, ¼c. to ½c. higher; pig tin, carloads, 41.50c.; small lots, 43.50c.; lead, desilverized, 4.55c. to 4.60c.; corroding, 4.80c. to 4.85c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 5.45c. to 5.50c.; Cookson's antimony, 10.50c., and other grades, 9.75c., in small lots; sheet zinc, \$8, f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 14c.; copper bottoms, 12.75c.; copper clips, 13.25c.; red brass, 12.75c.; yellow brass, 9.50c.; lead pipe, 4.12½c.; zinc, 4.25c.; pewter, No. 1, 26c.; tinfoil, 32.50c.; block tin pipe, 36c.

St. Louis

OCTOBER 6.—The metal markets have eased off somewhat, particularly in the Missouri products, though there has been no pronounced weakness in prices. Lead is quotable at 4.40c. bid and 4.45c. asked; spelter, 5.35c.

bid and 5.40c. asked; tin, 40.85c. to 41.35c.; Lake copper, 17.35c.; electrolytic copper, 17.15c. to 17.25c.; Cookson's antimony, 8.65c. In the Jcplm ore market a weaker condition prevailed, with the result that the best settlement price was \$48 per ton, this being on a basis of \$45 for 60 per cent. ore. The basis range ran as low as \$42. Calamine brought a basis of \$21 to \$22 per ton for 40 per cent., while the choicer ores brought as high as \$27 on settlement. Lead ore dropped to \$56, being \$2 less than last week for 80 per cent. On miscellaneous scrap metals we quote dealers' prices as follows: Light brass, 5.50c.; heavy brass and light copper, 10c.; heavy copper and copper wire, 11.50c.; zinc, 2.75c.; tea lead, 2.75c.; tinfoil, 30c.; pewter, 24c.; lead, 3c.

Iron and Industrial Stocks

NEW YORK, October 8, 1913.

The consummation of tariff revision by the passage and signing of the Simmons-Underwood tariff bill has been made the occasion of an attack on industrial securities, and prices have shown quite a recession. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Am. Can. com.....	33 - 34½	Nat. En. & St., pref.....	82
Am. Can. pref.....	93½ - 95½	Pressed Steel, com. 25½	26
Am. Car & Fdy. com. 44½	44½	Pressed Steel, pref. 97	99
Am. Car & Fdy. pref. 116	116½	Railway Spring, com. 24½	26
Am. Loco., com.....	29½ - 31½	Republic, com.....	19 - 21½
Am. Loco., pref.....	98 - 104½	Republic, pref.....	78½ - 84½
Am. Steel Foundries 27	27½	Rumely Co., com.....	19½ - 20
Bald. Loco., pref.....	105	Rumely Co., pref.....	48½
Beth. Steel, com.....	32 - 35½	Sloss, com.....	30
Beth. Steel, pref.....	70 - 73½	U. S. Steel, com.....	56 - 60½
Case (J. I.), pref.....	95½	U. S. Steel, pref.....	105¾ - 108½
Colorado Fuel.....	28½ - 29½	Va. I. C. & Coke.....	43 - 44
General Electric.....	144 - 145½	Westinghouse Elec. 66¾	69½
Gr. N. Ore Cert. 32	35½	Am. Ship, pref.....	93¼ - 93½
Int. Harv., pref.....	116	Chic. Pneu. Tool.....	52 - 53½
Int. Harv., Corp., 107	107½	Cambria Steel.....	48¾ - 50½
Int. Harv., Corp., pref. 114½	114½	Lake Sup. Corp., 25	25½
Int. Pump, com.....	7	Crucible Steel, com. 15	16½
Lackawanna Steel 36	37	Crucible Steel, pref. 86	89
Nat. En. & St. Com. 11	11½	La Belle Iron, com.....	44½

Dividends Declared

The Pittsburgh Coal Company, regular quarterly, 1¼ per cent. on the preferred stock, payable October 25.

The Rhode Island Perkins Horseshoe Company, regular quarterly, 1 per cent. on the preferred stock, payable October 15.

The American Screw Company, regular quarterly, 2½ per cent., payable September 30.

The E. W. Bliss Company, regular quarterly, 2 per cent. on the preferred stock, payable October 1.

The Canadian Locomotive Company, regular quarterly, 1¾ per cent. on the preferred stock, payable October 1.

The National Fire Proofing Company, regular quarterly, 1 per cent. on the preferred stock, payable October 15.

The Nova Scotia Steel & Coal Company, Ltd., regular quarterly, 1½ per cent. on the common stock and 2 per cent. on the preferred stock, both payable October 15.

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent., payable October 1.

The Westinghouse Electric & Mfg. Company, regular quarterly, 1¾ per cent. on the preferred stock, payable October 15, and 1 per cent. on the common stock, payable October 30.

The Vulcan Detinning Company has again passed the quarterly dividend on its preferred stock. Accrued dividends on the preferred now amount to 22¾ per cent. Litigation involving the American Can Company's accounting has taken another twist, as a remittitur from the New Jersey Court of Appeals was sent down to the Court of Chancery August 27 last. It is expected hearings will begin in the current month. The matter should be completed before the end of the year.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent. on the preferred stock, payable October 20.

The Copper Producers' Association again reports a heavy reduction in the stock of marketable copper in the United States. The stock on hand October 1 was 29,793,094 lb., against 38,314,037 lb. September 1, showing a reduction of 8,520,943 lb.

The McCue Company, Buffalo, N. Y., has been reorganized and will be known hereafter as the Houk Mfg. Company.

Obituary

WILLIAM J. ISAACSON, for 21 years a resident of Cincinnati, Ohio, died in Los Angeles, Cal., September 13, aged 65 years. He was born in Christiania, Norway. His parents came to Brooklyn, N. Y., in 1851, and in the following year established their home in New Haven, Conn. As a boy, he enlisted in the Twentieth Regiment of Connecticut Volunteer Infantry in 1862 and served as a private and as a musician until the regiment was mustered out. Mr. Isaacson then engaged in the iron and tin plate business in the United States and England, residing in Liverpool for 14 years. In 1885 he became managing director of the Dayton Coal & Iron Company, of Cincinnati, Ohio, and Dayton, Tenn. For 21 years he remained in this position, residing in Cincinnati, becoming exceedingly well known in the iron trade of the Middle West. In 1906 he retired from business on account of failing health. The end came after eight months of illness in California. He leaves a widow and one son, D. W. Isaacson, Benson, Ariz.

NATHANIEL BAXTER, JR., died at Nashville, Tenn., September 29, from pneumonia. He was a former president of the Tennessee Coal, Iron & Railroad Company. He served in the Confederate army in the civil war, enlisting in October, 1861. After the war he read law in Nashville, and from 1871 held various clerical positions connected with the courts. About 1883 he became president of the First National Bank, Nashville, serving in that capacity for eight years, when he resigned to become president of the Tennessee Coal, Iron & Railroad Company. After holding that position for some years, he retired to a farm. Two years ago he was elected to the State Senate and was chosen speaker of that body.

JOHN Q. DENNEY, long prominent in the operation of rolling mills in central Pennsylvania, died September 28, at Columbia, Pa., aged 81 years. When a young man he became connected with a mill at Columbia, shortly afterward removing to Harrisburg, where he took charge of the Paxton Rolling Mills, one of the McCormick enterprises. Improved plate mills were built under his management. Subsequently, in connection with J. W. Steacey, of York, Pa., he operated the Columbia and York Rolling Mills, which later became the property of the Susquehanna Iron Company.

WILLIAM CLARK WOOD, organizer and president of the New York Switch & Crossing Company, Hoboken, N. J., a director of the Hoboken Trust Company, and a member of the Board of Trade of that city, died of heart disease at his home in Hoboken October 6, aged 61 years.

ROBERT C. GARDNER, of the sales force of the Lukens Iron & Steel Company, Coatesville, Pa., with headquarters in Philadelphia, died October 2 after a short illness. He represented the company in the Philadelphia district and in the South.

HENRY B. LUPTON, vice-president Oliver Iron & Steel Company, Pittsburgh, died at his home in that city on Monday, October 7, after a long illness.

Upward of 1200 employees of the American Sheet & Tin Plate Company at South Sharon, Pa., have sent a petition to United States Senator George T. Oliver, protesting against the efforts of the Government to dissolve the United States Steel Corporation. The petition came voluntarily from the employees, and recites that under the administration of the Steel Corporation the working conditions in the tin plate mills at South Sharon and elsewhere have been very much bettered. Improvements made at the plants include pension systems, holding of stock or profit sharing, medical aid to the injured, improvement in sanitary and working conditions, etc.

L. Vogelstein & Co., 42 Broadway, New York, furnish the following figures of German consumption of foreign copper from January to July, 1913: Imports, 134,293 tons; exports, 6010 tons; consumption, 128,283 tons. The consumption for the same seven months in 1912 was 120,071 tons. Of the quantity imported in 1913, 115,349 tons was received from the United States.

The erection of the steel for the two new steel plants to be built in Cleveland, Ohio, was started by the American Bridge Company this week. The buildings under way are for the open-hearth plant of Corrigan, McKinney & Co., and the jobbing mill building of the Otis Steel Company.

Pittsburgh and Valleys Business Notes

The Riter-Conley Mfg. Company, Pittsburgh, has received a contract from the Broken Hill Proprietary Company, Ltd., Newcastle, New South Wales, for an open-hearth building and six mill buildings. The main building will be 74 x 675 ft. and the engine house, 50 x 425 ft. These buildings will require about 3000 tons of structural steel. The Riter-Conley Company is the low bidder on 2500 tons of riveted steel pipe work for the Los Angeles aqueduct and expects to secure the contract.

Work on the new blast furnace being built by the Clinton Iron & Steel Company, Pittsburgh, is progressing rapidly, and the stock is expected to be ready for operation late in November or early December. It will be recalled that the old stack collapsed last spring, and the new stack is being erected to take its place. It will have a daily capacity of 350 to 400 tons.

The Allegheny Steel Company, Brackenridge, Pa., maker of sheets, plates and specialties, has filed notice at Harrisburg, Pa., of an intended increase in its debt from \$438,000 to \$688,000.

Effective Wednesday, October 1, a number of leading shippers of bituminous coal in the Pittsburgh district advanced prices 10 to 15c. per ton for spot shipment, and sales are reported for delivery over the remainder of the year at the advanced price. The coal trade in the Pittsburgh district this year has been very good, the demand having been heavy and prices higher than last year. The following prices are now being asked: Slack, \$1.10; nut, \$1.40; mine run, \$1.40; ¾-in., \$1.50; 1¼-in. domestic, 65c. a ton at the mine.

The Blaisdell Machinery Company, Bradford, Pa., maker of vacuum cleaner apparatus, automatic sewage ejectors, air and gas compressors, will also engage in the manufacture of gas engines designed almost exclusively for air and gas pumping. C. A. Roberts, formerly with the National Transit Company at Oil City, Pa., later president of the Bellefonte Engine Company, Bellefonte, Pa., is now connected with the Blaisdell Machinery Company.

The Youngstown Car & Mfg. Company, Youngstown, Ohio, designer and builder of industrial equipment, has been somewhat annoyed over the recent printing of a report that the Youngstown Car & Mfg. Company was legally winding up its affairs. The statement is correct, but it refers to an old company from which the Youngstown Car & Mfg. Company bought its plant and buildings. The latter company is continuing the business and has not wound up its affairs.

The United States Stamping Company, Moundsville, W. Va., has let a contract for a two-story brick and concrete addition to its plant, 80 x 220 ft., to be used as a stamping room.

The Pittsburgh office of the Allis-Chalmers Mfg. Company, J. Weidman Murray, manager, has received an order from the Cambria Steel Company for the installation of a 6000-kw. turbo-generator set, as an addition to its power plant equipment.

Five of the 14 80-ton furnaces in the new open-hearth steel plant of the Carnegie Steel Company, at Bessemer, Pa., are now in operation. It is expected that two or three more furnaces will be started this month.

Samuel Diescher & Sons, Farmers' Bank Building, Pittsburgh, consulting engineers for the Wheeling Sheet & Tin Plate Company, have placed an order with E. E. Brosius, Machesney Building, Pittsburgh, for 50 hot mill trucks to be used in the new tinplate mill now being built at Yorkville, Ohio.

The Doubleday-Hill Company, Pittsburgh, is erecting a 60-kw., 300-lb. Bailey electric resistance heating furnace in Machinery Hall at the Pittsburgh Exposition for demonstration. The Bailey furnace is manufactured at Alliance, Ohio, and a number of installations have been made recently in this country.

The Wheeling Steel Casting Company, West Virginia, has established a Pittsburgh office in room 304, Oliver Building, in charge of L. H. Collingwood.

Reports of Julian Kennedy, appointed to appraise the plants of the Wheeling Steel & Iron Company, LaBelle Iron Works, Wheeling Corrugating Company, Whitaker-Glessner Company and Portsmouth Steel Company, of

Price, Waterhouse & Co., who appraised the accounts, and of H. G. Dalton, who appraised the ore properties, have been filed with the committee that has in charge the project for the consolidation of the above-named concerns. The committee is now going over these reports and trying to arrive at a satisfactory basis of values for the different plants. It is intimated, however, that the prospects for the consolidation are not reassuring. Should the scheme fail this time, it will probably never be taken up again.

The United States Stamping Company, Moundsville, W. Va., which is adding a new building, 80 x 220 ft., to its plant, states that it will not need any additional machinery.

The Erie Malleable Iron Works, Erie, Pa., which is making some large additions to its plant, has leased from the city of Erie a portion of Cherry street for 25 years, which will be utilized for the extensions now under way.

Smelting Titaniferous Magnetite

Important Experiments to Be Made at Port Henry, N. Y.—Magnetic Separator to Be Used

Mention has been made in these columns of the fact that a company had leased from the Northern Iron Company its Cedar Point furnace at Port Henry, N. Y., for an experimental run on titaniferous iron ores of the Adirondack district. The enterprise is controlled by E. Shearson, president MacIntyre Iron Company, 71 Broadway, New York. Further information concerning this project is given by L. O. Kellogg in the Engineering and Mining Journal for September 27, 1913, part of the article being as follows:

"The MacIntyre Iron Company owns what is probably the most extensive and richest deposit of titaniferous magnetite in the Adirondack region, at Tahawus some 30 miles north of North Creek, the end of a branch of the Delaware & Hudson Railroad. The company already has ordered or has delivered on the ground sufficient machinery for erecting a separator capable of treating 24 tons of crude ore per hour. This material will average about 49 per cent. iron and about 20 per cent. titanic acid. With the magnetic separator it is planned to take out the magnetite proper and discard the nonmagnetic ilmenite so as to obtain a product running between 56 and 60 per cent. iron and 9 to 12 per cent. titanic acid. This concentrate will be transported to North Creek by logging locomotives of the caterpillar type, hauling trailers over the snow, and then be taken by rail to Port Henry. The method of work will be to begin with a mixture of the titaniferous concentrate and ordinary magnetite, in the ratio of about 1:7, and increase the proportion of the refractory material until it is no longer possible to smelt. Just how high a ratio can be handled is a question, but it is a fact that slags running as high as 4 or 5 per cent. titanic acid are not uncommon.

"Rather recently the owners of the Tahawus deposit sent 700 tons of the crude ore to the Bethlehem Steel Company, and as a result were offered a contract for 3,000,000 tons, which, however, they did not feel like accepting because of certain contingent conditions. It would appear, however, that the Bethlehem Company was sure of its ability to smelt such ores. It is stated that some time ago the Colorado Steel & Iron Company by mistake bought some 10,000 tons of titaniferous magnetite, which was piled for discard when its true nature was discovered. However, a mistake was made in the weight of another lot of ore of entirely different nature, which ran a number of tons short when cleaned up. In order to take care of the discrepancy the furnace man ran in the titaniferous material and as far as known no difficulties were encountered.

"The commercial possibilities of this smelting, however, are not yet known, and it is this that the MacIntyre company intends to investigate. It is hoped to ship the residue from the separating operation, which will be high in titanium, to Niagara to make ferro-titanium; but under present conditions only a limited amount of this material can be absorbed."

A complete account of these Adirondack iron ore deposits at Sanford Lake was given in *The Iron Age* of October 14, 1909.

Personal

James Hartness, president Jones & Lamson Machine Company, Springfield, Vt., has been nominated for president of the American Society of Mechanical Engineers. The other nominations are as follows: for vice-president for two years, H. L. Gantt, consulting engineer, New York, E. E. Keller, president Detroit Insulated Wire Company, Detroit, and H. G. Reist, mechanical engineer General Electric Company, Schenectady, N. Y.; for managers for three years, Prof. A. M. Greene, Jr., professor of mechanical engineering, Rensselaer Polytechnic Institute, Troy, N. Y., John Hunter, chief engineer, Union Electric Light & Power Company, St. Louis, and Elliott H. Whitlock, factory manager, National Carbon Company, Cleveland; for treasurer, William H. Wiley, New York.

James Duane, Jr., who has been superintendent of the Midland plant of the Pittsburgh Crucible Steel Company, Midland, Pa., for several years, has been appointed superintendent of the Saucon furnaces of the Thomas Iron Company at Hellertown, Pa., taking charge immediately.

Samuel S. Wales, formerly chief electrician at the Ohio works of the Carnegie Steel Company, Youngstown, Ohio, has gone to London, England, to represent the Carnegie Steel Company abroad.

John A. Topping, chairman of the board of directors, and Charles T. Johnston, general sales agent, of the Republic Iron & Steel Company, have returned from a month's hunting trip in Canada.

Arthur Joseph, assistant treasurer of the Joseph Joseph & Brothers Company, Cincinnati, Ohio, has left on a three months' pleasure and business trip to the Pacific coast.

Willis L. King, vice-president Jones & Laughlin Steel Company, Pittsburgh, has returned from Europe.

N. P. Hyndman, sales manager for the Washington Coal & Coke Company, Pittsburgh, has gone to California.

S. I. Merrill has resigned as president and general manager of the California Industrial Company, Los Angeles, Cal., and A. C. Denman, Jr., has been elected vice-president and general manager. The company manufactures bar iron and steel, bolts and nuts.

Charles E. Hulick, who has been superintendent of the Saucon furnaces of the Thomas Iron Company at Hellertown, Pa., since 1903, has been promoted to superintendent of the company's Hokendauqua furnaces at Hokendauqua, Pa.

W. H. Gibb, for five years connected with the Brown Instrument Company, Philadelphia, has resigned to become general manager of sales of the Stupakoff Laboratories, Pittsburgh, effective October 1.

E. W. Mudge and R. B. Campbell, of E. W. Mudge & Co., Frick Building, Pittsburgh, are in Canada on a hunting trip.

Richard Moldenke, Watchung, N. J., chairman; Walter Wood, R. D. Wood & Co., Philadelphia, vice-chairman; George C. Davies, Pilling & Crane, Philadelphia, secretary, are the newly elected officers of Committee A-3 on Standard Specifications for Cast Iron and Finished Castings, of the American Society for Testing Materials.

Emil W. Netter, whose headquarters for the present are with Beer, Sondheimer & Co., 42 Broadway, New York City, is now in this country for a six months' visit. He is planning particularly to visit sheet mills, with special attention to management and labor problems in plants of this type and in other industrial establishments. He is identified with the firm of Wolf, Netter & Jacobi, manufacturers of galvanized and especially lead-coated sheets and sheet metal furniture, such as filing cases, metal shelving and the like, with mills near Strassburg, Germany, and main offices in Berlin.

W. C. McKee has resigned his position as superintendent of blast furnaces of the Inland Steel Company, Indiana Harbor, Ind., and on October 4 became general superintendent of the Thomas Iron Company, in charge of the company's blast furnace plants at Hokendauqua, Hellertown, Alburts and Island Park, Pa. He will make his headquarters at Hokendauqua.

The Hoskins Mfg. Company, Detroit, Mich., maker of electric furnaces, pyrometers and heating appliances,

announces the appointment of F. L. Zimmerman as its Eastern representative, with headquarters at 30 Church street, New York, succeeding E. L. Smalley.

Emil Pollak, president Pollak Steel Company, Cincinnati, Ohio, has returned from a six months' tour of Europe.

Arthur C. Pletz has severed his connection with the Ideal Steel Wheel Company, Cincinnati, to become general manager of the Aurora Tool Works Company, Aurora, Ind.

S. M. Udale, formerly assistant research engineer with the Studebaker Corporation, is now in charge of the laboratory and motor-testing plant of Joseph Tracy, whose New York office is in the United States Rubber Building, 1790 Broadway.

L. A. Harding, who was in charge of the department of mechanical engineering at the Pennsylvania State College, State College, Pa., for two or three years and later practicing mechanical engineering in New York City, has been appointed professor of experimental engineering at the University of Illinois, Urbana, Ill.

E. P. Ross, who has been manager of the Cranberry Furnace Company's furnace at Johnson City, Tenn., for the past five years, has accepted a position with the Edgar Thomson works of the Carnegie Steel Company.

R. M. Hawkins, Jr., who has been representing the Hill Clutch Company in New York since January last, will leave the company's service and return to Cleveland, Ohio.

H. H. Althouse, consulting engineer, has opened an office in the Woolworth Building, 233 Broadway, New York. Mr. Althouse, who was formerly with the Erie Railroad, specializes in coal and ore plants and the elimination of railroad grade crossings.

Charles L. Doyle, for some years with the Pickands Magee Coke Company, has become Pittsburgh sales agent of the Producers Coke Company, with offices in the First National Bank Building, Pittsburgh. The Pickands Magee Coke Company will retire from business, effective December 31, 1913.

Dr. W. F. M. Goss, dean of the engineering department of the University of Illinois, has been granted a leave of absence for one year to accept the chairmanship of a commission appointed by Chicago to work out a solution of its problem of smoke abatement and of the electrification of the railroad terminals in that city.

George G. McMurtry, New York, chairman of the board of directors, American Sheet & Tin Plate Company, returned Wednesday from a European trip of several months.

The steel plant of the Morris Iron & Steel Works, Frederick, Md., is now in operation, the product being used in making steel castings. This plant is equipped with a Wills combination steel furnace, designed and built by E. Cooper Wills & Co., of Frederick. This furnace embodies features of the open-hearth process, the side-blow converter process and the electrical process, covered by patents granted to Mr. Wills August 28. The first heat of the new furnace is stated to have been successful in every particular, the product, 5000 lb., being steel of high quality. The furnace is so constructed that the changes can be made from one process to another in a few minutes. All its manipulation is controlled by one man, thus producing steel at a minimum cost of labor.

The disappearance of Dr. Rudolph Diesel, inventor of the Diesel oil engine, will not, it is stated by the officials of the Busch-Sulzer Bros.-Diesel Engine Company, of St. Louis, Mo., interfere in any way with the progress of that company, which has almost completed its great plant. Most of the machinery for the plant has been received and much of it has been set. It is expected to have the plant in operation in a short time. Dr. Diesel was in St. Louis in April of last year to participate in the ceremonies of beginning work on the plant now nearing completion. The officers of the company are as follows: Adolphus Busch, president; August A. Busch, first vice-president; James R. Harris, second vice-president and general manager.

The Steel Corporation Dissolution Suit

Hearings, Suspended in June, Resumed
October 1 in New York City—Iron Ore
Experts Testify for the Corporation

Hearings in the suit of the Government for the dissolution of the United States Steel Corporation were resumed before Examiner Henry P. Brown, of Philadelphia, at the corporation's offices, 71 Broadway, New York City, on Wednesday, October 1. The taking of testimony in behalf of the corporation was continued. A number of witnesses were called to show that the corporation was far from possessing a monopoly of the iron-ore supply. The first to take the stand was Prof. C. K. Leith, professor of geology in the University of Wisconsin, who was a member of the tax commission of Michigan and Wisconsin in 1911 and 1912, when a valuation was made of the ore deposits of the two States, served on the United States geological survey in the Lake Superior region for many years and has been employed in a consulting capacity for mining companies.

Professor Leith Gives Important Information

After a preliminary examination as to his experience and qualifications as an ore expert, he was questioned by David A. Reed, attorney for the corporation, as follows:

Q. Can you tell what percentage of the available ores in Michigan is controlled by the Steel Corporation? A. In 1911 it was about 30 per cent., and slightly less in 1912.

Q. Why should it decrease? A. Owing to outside explorations and discoveries.

Q. Would the Steel Corporation's ownership be changed if the ore in the depths [below the lowest developed level] was taken into consideration? A. Yes, it would be diminished.

Q. Have the discoveries kept pace with the shipments? A. They have been considerably in excess.

Professor Leith explained that it is not possible accurately to measure the Michigan old range deposits as they continue to disclose further large quantities of ore as the workings go down. He said that the known contents of the Michigan ranges have been increasing constantly. He further said the Steel Corporation had been the least active of any company having interests in the Michigan ranges in the direction of acquiring more ore lands or in developing new deposits. More exploration work had been done by the Cleveland-Cliffs Iron Company, Pickands, Mather & Co., M. A. Hanna & Co., and others. The Cleveland-Cliffs Company controls about twice as much ore now as the Steel Corporation in that district.

POSSIBLE FOR NEW STEEL COMPANIES TO GET ORE SUPPLY

Mr. Reed asked whether it would be possible at the present time for a new steel manufacturing company to obtain in the Lake region a sufficient ore reserve, putting its needs at 2,000,000 tons a year or 100,000,000 tons in all. Professor Leith said it would. Most of it could be obtained in the Cuyuna Range, and other supplies were available, aside from the Hill ore holdings, now under lease to the Steel Corporation, which lease will expire in a little more than a year. Besides the available ore, he said, there were other deposits, the exploration of which was not actively carried on because independent ore mining companies are not able to sell their present output. The Jones & Laughlin Steel Company, the Lackawanna Steel Company, and the Inland Steel Company, all outside of the Steel Corporation, had considerably increased their holdings without causing a ripple in the ore market. If an attempt were made to monopolize Lake ores, he said, companies that wanted to sell to the monopolists would begin new explorations that would result in bringing to light enormous additional supplies.

Professor Leith further deposed that there are known to be many hundreds of millions of tons of lower grade ores available for use. In the Huronian series in the old ranges it is estimated that there are at least two billion tons of 45 per cent. ore.

BRAZILIAN ORE DEPOSITS

Since 1910 Professor Leith has been connected with iron ore developments in Brazil. He testified that in the

Rio Doce Valley alone, without going deeper than 600 ft., there are at least one billion tons of ore of a higher quality than can now be found in this country, running 64 to 69 per cent. in iron and low in phosphorus. These deposits are not controlled by the Steel Corporation and are accessible for shipment to the Atlantic ports of this country. He said arrangements are being made to construct railroad coast connections and build steamships to market the ore in Philadelphia and Baltimore. A conservative estimate of the ore deposits in Brazil is four billion tons.

Professor Leith said this district has a climate the most healthy in Brazil, and is the most thickly populated. A company is being exploited to ship this ore to Atlantic coast ports and European ports at a cost of 8 to 9 cents per unit. He estimated the steamship haul from Victoria to New York at about \$3 per ton compared with the present rate of about \$2.75. The new company will have a line of vessels, docks at Victoria, and a railroad from Victoria to the mines.

Cross-examined by Henry C. Colton, for the Government, Professor Leith named various large Lake Superior ore properties available for purchase, admitting that most of them had been developed since 1911 when this suit began.

The Cuyuna Range Described by George P. Crosby, Chester E. Tripp and Carl Zappfe

George P. Crosby, of Duluth, explorer of iron mines, who has for many years been active on the Mesaba Range and for the past eight years has been giving his attention to the Cuyuna Range, testified that the ore bodies found on the latter range total about 435,000,000 tons of iron ore and about 25,000,000 tons of manganiferous ore, with a large part unexplored. The Cuyuna Range mines now shipping contain 100,000,000 tons or more, of which the Steel Corporation owns only a part. He estimated that the unexplored land in the range would yield 350,000,000 to 400,000,000 tons. This land is for sale or lease at a fair price.

On cross-examination Mr. Crosby refused to give a list of properties on the Cuyuna Range, with an estimate of the ore in each, stating that if he did so it would not be long until he would be unable to get anyone to do business with him on the range.

Chester E. Tripp, president Rogers-Brown Ore Company, testified there was plenty of ore land on the Cuyuna Range that could be purchased by anyone at a reasonable figure.

Two witnesses were examined on Thursday. The first was Carl Zappfe, geologist for the Northwest Development Company of St. Paul, who said he had been familiar with the Cuyuna Range since 1905, that it extended for 60 miles, 30 of which were commercially developed, and that its output in 1911 was 147,000 tons. He estimated the known deposits at 400,000,000 tons. His own company had explored about 93,000,000 tons.

William N. Merriam Testifies as to Lake Superior and Brazil

William N. Merriam, a Steel Corporation geologist in the Lake Superior district, said that since the estimate made by the Michigan Tax Commission, on which the Government relies partly to show that the Steel Corporation has most of the ore, at least 25,000,000 tons had been discovered.

Q. Would it be possible for any one to get a corner on the ore in the Lake Superior District? A. Practically impossible, as new deposits would always be coming to light, and the only way to keep the corner would be to keep on buying.

Other steel manufacturers, he said, had ore interests there and were making acquisitions. With one or two exceptions they were getting control of reserves for the future. Mining companies were able to sell all the ore they took out, but he thought they could take out more

than they could sell. "There has never been a time when it was not possible to buy up large ore reserves," he said. "And a company purchasing at the present time would not be at a disadvantage in competing with the concerns which bought their mines years ago."

The Steel Corporation sent Mr. Merriam to Birmingham, Ala., in November, 1907, to investigate ore lands that the corporation had acquired when it took over the Tennessee Coal, Iron & Railroad Company.

"What were your instructions from the Steel Corporation?" he was asked by Judge Dickinson. Mr. Merriam answered: "They said: 'We want you to go down there and see if we have bought a gold brick.'"

EXTENT OF BRAZILIAN DEPOSITS

Mr. Merriam told of a trip to the iron ore deposits of Brazil in 1909-1910, when he spent three months on horseback and afoot investigating those deposits for the corporation. He said he had taken options on some of this property, and advised the Steel Corporation to purchase, but, he said, "I was notified within two weeks that they would not take up the options."

"Do you know of any better quality ore anywhere?" he was asked. He replied: "I know of none in any quantity as good."

The witness said that, assuming a depth of 1200 ft., which is not unreasonable in that section, there are seven or eight billion tons of ore there, one-fourth of which is of superior quality. Easing his estimate on 1910 figures, he said this ore is worth \$7.65 a ton at any Eastern blast furnace, and that it could be laid down in Philadelphia for \$4.83 a ton. He believed it would be salable at a higher price than that in any condition of the market we have had for many years. He testified that these mines are owned by Brazilian interests, an English company and an American company, and that the Steel Corporation had no interest there.

He added that a large part of this Brazilian ore was 35 per cent. ore, and would not be in commercial demand for 200 years or more.

THE ABUNDANCE OF LAKE SUPERIOR ORE

Asked whether there was enough available iron ore in the Lake Superior region obtainable at a fair price to start a new steel corporation requiring 1,500,000 tons of ore yearly for 50 years, Mr. Merriam thought there was. Judge Dickinson asked if there was enough for two, three and finally four such companies, and the witness answered yes in each case, basing his estimate on "known and developed ore." He said that two-thirds of it could be mined in the Cuyuna Range.

On Friday Mr. Merriam was cross-examined at length by Judge Dickinson. Replying to a question, the witness said he thought an ore reserve was an excellent policy, but was no longer essential. A small manufacturer could acquire new ore lands as fast as he exhausted his holdings. In the Mesaba region, he said, there were 600,000,000 tons not tied up to any of the steel or iron companies. The Hill holdings, which will be released by the Steel Corporation after the end of next year, would alone account for 200,000,000 tons.

"How much of the ore in the Mesaba is now commercially available?" was asked.

"Fifty per cent.," he replied.

He said he could not have told in 1901 or 1902 how much ore the lands of the Steel Corporation contained.

"Is it not true that in the Mesaba and Vermilion ranges the Steel Corporation owns the best and the most of the available ores?"

"In the Vermilion, yes. It owns practically all of that range. In the Mesaba there are independent holdings as great as those of the Steel Corporation."

President Olcott Shows How Ore Supply Increases

William J. Olcott, president Oliver Iron Mining Company, a Steel Corporation subsidiary, was next called. He testified that iron mines are now worked to a greater depth than formerly, and consequently known deposits had been greatly increased. He was assistant engineer of the Chapin mine in 1885, and at that time the depth of the workings was 700 ft. Today the depth is 1500 ft., and the mine is yielding as well as ever, despite the fact that it had been worked for so many years. The Ashland mine, with which he had been connected, was worked to a

depth of only 125 ft. when he was first employed there. Now operations are carried on for 1500 ft.

All the mines, he said, kept up in quantity and quality, as mining was carried further down, and there were no indications of the end of the ore being reached. The Newport mine had been carried down 2500 ft. without any deterioration in the output, and he believed that at a depth of 5000 ft. the cost of mining would not be so great as to make it unprofitable.

PLENTY OF ORE FOR NEW STEEL COMPANIES

A steel mill with requirements of 1,500,000 tons a year, he said, would have no trouble in acquiring a reserve for 50 years. He would look for such reserves in the Lake Superior region, because they could be obtained there at a reasonable price. In this he included the Cuyuna Range, a development of the last few years, where the Steel Corporation has no holdings.

There had been no time in the last 11 years, he said, when it was impossible to mine all the ore that could be sold, and although companies had been buying reserve lands, there had been no scramble for them in recent years.

Q. What would be the result of the attempt to monopolize the ore lands in the Lake Superior region? A. It would be almost impossible to effect, in the first place.

Q. If it were effected, what would be the result? A. I think there would be more exploration and development and the available supply would be greatly increased.

THE BESSEMER ORE SITUATION.

On Monday, October 6, President Olcott continued his testimony, having particular reference to the corporation's Bessemer iron ore holdings. In searching for new ore lands, he said, the corporation had above all in mind the discovery of Bessemer ore, because its Bessemer holdings were smaller than its tonnage of non-Bessemer.

"Has it been easy or difficult to keep up with the previous demand for Bessemer ore," Mr. Olcott was asked. "It has been more and more difficult year by year," was the reply. He said that the independent steel plants with open-hearth furnaces were in an easier situation than some of the corporation's subsidiaries because they did not need to use Bessemer ore.

The defense put into evidence a table which showed that from 1907 to 1911, inclusive, the Steel Corporation's shipments from Lake Superior had been 99,274,828 tons, a yearly average of 19,854,966 tons, while the aggregate shipments of the independent companies had been 87,050,964 tons, an average per year of 17,410,913 tons. From the yearly average to tonnage used in the period the corporation's reserves would last 46½ years and the independents' reserves 63½ years. The corporation's reserves as of January 1, 1912, were 922,592,585 tons, and those of independents 1,100,570,491 tons.

Professor Helge Backstrom, a member of the Swedish Senate and a well-known geologist, took the stand and gave some important data about Swedish iron ore deposits. He said: "In my estimation there is iron ore enough in the world to last for centuries. Iron ore is in all parts of the world and is being discovered constantly."

On Tuesday President Olcott continued his testimony as to the Steel Corporation's long search for Bessemer ore. He told of 17 options which were taken and drilled in the Cuyuna Range at a cost of \$102,000 to the corporation, and as none of the high grade ore was found, they were given up.

Testimony of Other Ore Experts

John U. Sebenius, chief engineer of the Oliver Iron Mining Company, was called to corroborate President Olcott's statements. On cross examination he admitted that on January 1, 1912, the corporation owned or controlled in the Mesaba Range 1,076,000,000 tons out of a total of 1,397,442,806 tons; in other words, that the corporation has 76 per cent. of the ore in this great range.

Price McKinney, a miner and seller of ore, connected with Corrigan, McKinney & Co., told of a long list of independent mines in the Lake Superior district that were not operated to their full capacity. He said he had no connection with the Steel Corporation. "These mines are not being operated to their full capacity because we have not the customers for the product," he said. "We do not like to pile the ore up outside the mine for reserve

because then the tax commissioners get after us." He added that his firm had never been able to sell the total capacity of its mines any year since its formation in 1889, and said that to take care of the excess output it had been forced to build furnaces at Cleveland. Corrigan, McKinney & Co., he said, would be willing to contract for the sale of surplus ore to the extent of 1,500,000 tons a year for 10 years.

James T. Hale, an attorney and iron ore prospector of Duluth, was put on to tell of his efforts to induce the different railroads entering Duluth to build a branch to his mines in the Mesaba Range. He said that all the roads refused and the branch was finally built as a private enterprise.

Frank L. Nasan, a consulting mining geologist of West Haven, Conn., was put on the stand to testify regarding the deposits in New York State. He was formerly assistant state geologist of New Jersey and is now consulting engineer of Witherbee, Sherman & Co., owning iron mines in Essex County near Lake Champlain. He said that his company owned 250,000,000 tons of ore and that other companies controlled about 800,000,000 tons. Some of these mines, he said, are over a mile in depth.

Correspondence

Triplexing in Steel Works vs. Bessemer Duplexing

To the Editor: I have read with interest the articles appearing in recent issues of *The Iron Age* in connection with the Brussels meeting of the Iron and Steel Institute, on the Talbot tilting open-hearth furnace. I noted particularly Mr. Talbot's claims of economy in the operation and maintenance of tilting open-hearth furnaces of the present day as compared with the stationary open-hearth furnaces; also the recent wonderful tonnage records in the production of so-called Bessemer duplexed basic open-hearth steel in the Lackawanna Steel Company's new tilting open-hearth furnaces used to supplement its Bessemer plant. These have given rise to the following questions:

1. Should not the advantages of the tilting basic-lined open-hearth furnace be regarded as indispensable, in the light of the low first cost of installation per ton of capacity, coupled with the further reduction in maintenance cost resulting from the much greater life of all tilting furnaces and consequent lessening of depreciation when they are only as "preliminary" furnaces and at the much lower than steel making temperatures made possible by the Wilmot triplexing process? By this latter only extra refined pig or semi-steel of high carbon is made in the preliminary basic furnace. Thus the tilting furnace can always be run at much lower temperatures than those required in furnaces in which steel is made from start to finish.

The preliminary furnace is used particularly to rapidly desilicize, dephosphorize, desulphurize and, to a fair extent, decarbonize the molten iron, and with extraordinary economy, particularly as regards fuel per ton of product. It also permits the blast furnace output being held up to much less rigid standards, thus lessening its cost; at the same time it can be inexpensively converted in the triplexing operation.

Fuel economy in the open-hearth furnace results particularly from the sharp reactions which take place in charging therein the molten metal from the blast furnace or storage mixer. With the triplexing process above mentioned, however, it is unnecessary to install a mixer except when it is desired to prepare for an extraordinary storage capacity for molten pig from the blast furnace.

From the preliminary furnace, metal is tapped at frequent intervals for charging into various stationary basic open-hearth furnaces. By prejudice, whether warranted or not, these latter are generally considered as more readily constructed to withstand the extra high steel making or finishing temperatures. These may be steel scrap or further refined molten iron or steel in the stationary furnace at the time of charging metal from the preliminary furnace—this, in order to secure in such finishing furnaces the sharp reactions which enable these furnaces, run at the high temperatures required for the steel making and fin-

ishing, to produce heats in from three to five hours time. These heats show extraordinarily low percentages of objectionable metalloids and, as is claimed, much greater freedom from ferrous oxides than when the pneumatic duplexing process has been used. The latter makes what is at first practically finished Bessemer steel, which then often passes through the basic open-hearth finishing furnaces in almost a continuous stream from charging door to tapping hole, with what may be called "a lick and a promise," in order that this steel may be given a change of name to that of basic open-hearth steel because of the latter's better reputation for uniformity and excellence of quality.

It is gratifying to note right here that the Lackawanna Steel Company is planning eight stationary basic open-hearth finishing furnaces to be erected near, and to be operated at will in connection with, the Talbot type of large tilting furnaces, four of which stationary furnaces are already started. Excellent quality and tonnage are predicted when they are properly run by the triplexing process.

2. In making real basic open-hearth steel, whether in one or more basic open-hearth furnaces used in series, can there be any question that such steel will be freer from ferrous oxides, and the ingots and finished products sounder and freer from pipings and blowholes, than steel, the metal for which has been virtually "shot" from the blast furnace into the form of ingots by way of the Bessemer converter (in which, for the purpose, practically finished Bessemer steel is often made) then most expeditiously run through the basic open-hearth furnace? The straight open-hearth steel furnace naturally gives a better opportunity to remove metalloids, to carry off ferrous oxides by slags, and improve the character of the slag by a partial removal and replenishment during the operation, affording the metal a better opportunity to purge itself without being burnt, as is possible when the pneumatic process is used. On the other hand the duplex process involves making practically finished Bessemer steel with unavoidable resultant ferrous oxides, due to the development of the heat without hydrocarbon fuels.

3. Assuming the correctness of the position taken in various papers and discussions, that soundness of ingots is so essential, particularly for the highest standard of, say, rail manufacture, and that such soundness is dependent largely upon the freedom of steel about to be cast into ingots, from various objectionable gases and particularly ferrous oxides, the question naturally arises as to the comparative freedom from such objectionable gases and ferrous oxides of the following:

(a) The regular Bessemer steel, such as rail steel.

(b) The real basic open-hearth steel; i. e., made from pig to finished ingot by and in only the basic open-hearth furnace or furnaces run in series, and without the employment of the pneumatic or Bessemer process for a part or practically all of the reducing in the steel making operation.

(c) The Bessemer-duplexed and basic-open-hearth-finished, or so-called basic open hearth, steel as made by a combination of the quick but oxidizing Bessemer converter and the basic open-hearth furnace for the finishing process.

4. Another question is whether the basic open-hearth steel made by the above mentioned "triplexing process" does not afford opportunities in regular practice for the production of sounder ingots and ingots freer from ferrous oxides than when the pneumatic or Bessemer process is employed to a large extent in the manufacture of any heat of steel, even if "finished" in a basic open-hearth furnace? All steel makers and buyers should consider, as an offset to the greater capacity per open-hearth furnace for Bessemer duplexing plants, the large per cent. of iron lost by the Bessemer process and its resultant ferrous oxides and their tendency to stiffen and harden the steel, which physical characteristic is commonly recognized as distinguishing Bessemer steel versus the softer and tougher basic open-hearth steel otherwise of the same general analysis.

5. With the "triplexing process" or even by a similar steel process termed the "Palmer-Wilmot duplexing process," which eliminates all blowing of the steel, using a preliminary furnace (for economic reasons preferably the tilting furnace) in which cold metal is charged in place of the molten metal from the blast furnace, and a basic open-

hearth steel finishing furnace (preferably that of the stationary type), will it not be possible to make steel running very low in phosphorus and sulphur, and in less than one-half to one-third of the time now required in the regular basic open-hearth process?

This triplexing process is the closet rival in production per furnace of the Bessemer duplexing process. It further makes steel freer from ferrous oxides; and if the finished product be rails or structural material, then with greater safety to the general public.

6. Is it not generally considered that real basic open-hearth steel—with no Bessemer converter treatment of the molten metal—runs much more uniform, especially when made or finished in moderate sized heats and in stationary basic open hearth furnaces, than when tapped direct from the extraordinarily large tilting open hearth furnaces? Is not steel finished in the latter more subject to insufficient time allowance for the "killing" of the molten metal in the furnace?

Has not the Wilmot "triplexing process" (eliminating converter treatment of any portion of the metal) all the advantages of the stationary furnace bath for final finishing of the steel, combined with the advantages and none of the disadvantages of the tilting or Talbot furnace for the preliminary treatment? There is the further advantage of a specially low temperature in the tilting furnace, prolonging the life and reducing the maintenance cost of such furnace, making a still more favorable comparison with any records for tilting furnaces or even stationary basic open hearth furnaces.

Much credit is unquestionably due Mr. Talbot for his progressive steel making methods, and it would seem that his process only needs such finishing touches in methods of utilizing it to overcome all former prejudices and make his broad ideas widely available for improving steel quality and at the same time reducing cost of plant and cost of maintenance.

There is no contention that Bessemer steel is not at times improved in quality by a further treatment in the basic open hearth furnace before being cast into ingots; but it is not as regularly of excellent quality when so finished or in the large units of tilting open hearth furnace as when refined only in the basic open hearth furnaces, especially when finished in the smaller units of the stationary open hearth furnace, where quality of output can be more closely controlled.

Extensive study of the subject, aided by experience in the making and working of steels, particularly for cold rolled and bright polished material to be subjected to deep stamping strains and grinding, polishing and electroplating, where physical and chemical defects are sure to come out and where perfect material and surface are necessary, warrants the intrusion of this communication upon your columns in the belief that it will be of interest and possible benefit.

FRANK ASHLEY WILMOT.

BRIDGEPORT, CONN., September 29, 1913.

Using the Suggestion Box Successfully

To the Editor: Some of the largest and most successful manufacturing plants in the country have established a suggestion box in which employees are invited to communicate their ideas for betterments in methods of operation. In one large machinery concern situated in the Middle West the opportunity for the employment of the idea appeared to be excellent. The house makes a line of equipment which is subject to constant change, and its product is also so varied as to make it certain that an occasional item ought to be able to stand improvement. The company operates a foundry, machine shop, forging department, plate and roll-bending shop and other important branches of machinery manufacture, and in each of these scores of possibilities for improved ways of doing things seemed to suggest themselves.

The notice regarding the institution of the plan was posted about a year ago. It was suggested, it may as well be explained, because of the report that a concern engaged in a somewhat similar line of work in the same city was using the plan to advantage, and it was not intended that the competing house should get any exclusive ideas from its men that might be duplicated by using a similar

scheme. It was confidently expected that when the men were informed of the opportunity which awaited them, they would hasten to develop ideas and submit them to the management of the company.

Two Reasons Why the Idea Failed

It happened, however, that the heads of the institution were rather conservative, and they saw to it that the notice was so worded that no risk whatever was run; in other words, they intended to see that they got value received for whatever money they gave out in this way. The notices stated that any suggestions received would be passed on by the company, and that if approved and put into operation, those who had submitted them would receive rewards commensurate with the value of the ideas.

Shortly after the box was installed—its location was near the main entrance of the plant, where the men could see it as they went to and from work—one or two suggestions were offered. Here another defect of the system presented itself. No one in particular had been charged with the duty of handling the suggestions. They were turned in to the president of the company, who was likewise plant manager, and he laid them aside for consideration when convenient. Ultimately they were lost sight of, the hopes of those who had proffered the ideas failed to materialize, and they decided not to tempt fortune another time.

Incidentally, few others tried the plan, and at present the suggestion box is seldom or never opened by those connected with the company, though it is still in place, and though the notices in the various departments of the plant are now soiled and blackened from their long stay in position.

The Operation of a Successful Case

The president of the company which was said to have used the plan successfully declared that after a two-year trial the company had decided that it was well worth while, and that it would be continued indefinitely, with possibly even more liberal conditions than heretofore.

"We have made plain to our men," he said, "that all we want to do is to make this a better place to work, from their standpoint as well as ours. The result has been that our men have realized that we are working to help them as well as ourselves. We have also endeavored to reward the man who makes a meritorious suggestion, even though it may not be possible to put it into execution. This happens not infrequently; for while we are in a position to carry out many of the ideas that come to us in this way, there are some which, under present conditions, are impracticable. Nevertheless, if they have basic merit, we see to it that the men who put them forward are properly rewarded, and are encouraged to submit other ideas."

The contents of the suggestion boxes, which are located in the several departments, are turned in to the superintendent, who consults with the heads of the various departments regarding them. In cases of important matters, the president and general manager are called on to decide regarding them. But the superintendent, as the person responsible for the condition of the plant, is the principal arbiter who passes on the worthiness of the suggestions.

Instead of merely posting notices when the plan was put into effect, a circular was put in the hands of each employee of the company. In this way every man was made to feel that he personally was looked to by the company to produce something of value, and consequently did not regard it as a pronouncement affecting everybody except himself, which frequently happens when notices of a general nature are posted.

The rewards which have been given by the company have ranged from \$5 to \$25 in cash; but in addition to these, men who have shown particular efficiency in devising new ideas are often rewarded even more substantially by increases in wages, these increases, as thus far recorded, being from \$50 to \$200 per annum. Enough cash rewards and advances in pay have been made known to impress the rank and file of the workmen, some 1500 in number, with the importance of the plan, and the officers of the company are convinced that the general spirit of the force has been improved by the legitimate desire on the part of the men to win one of the rewards.

Trade Publications

Fans and Blowers.—American Blower Company, Detroit, Mich. Bulletin No. 1, Series 1. Describes and illustrates the various types of American Sirocco fans, giving the constructional features and illustrations of complete installations. Considerable space is devoted to special information for engineers and architects, tables of capacities at varying pressures and the speed and horsepower required under given conditions.

Valves.—Williams Powell Company, Cincinnati, Ohio. Loose leaf circulars. Treat of valves intended for medium and high pressure steam and hot water work. Among the features mentioned are the long threads on the medium-pressure valves. The high-pressure valves have regroundable renewable disks. The disks fit into a socket and swivel freely, but are claimed to be easily removable.

Pumps, Dredges and Engines.—Morris Machine Works, Baldwinsville, N. Y. Illustrated catalogue. Size, 6 x 9 in.; 126 pages. The first part calls attention to the company's standard pump built for a wide range of delivery pressures, in both single and multiple stage types, horizontal and vertical models, for belt drive and direct steam and electric connection; and to a few special centrifugal outfits. Directions for installation and operation are given. The second part takes up dredge pumps and complete dredge outfits, and illustrates the electric suction dredge of St. Louis for levee construction work and a dredge used on the New York State Barge Canal. Interesting general information in regard to centrifugal pumps, dredges and hydraulics is included; formulas are given and worked out and curves showing efficiency under various conditions included. The third part treats of engines, principally used with the company's pumps but suitable for general stationary and marine use.

Oil Stone and Crane Grinder.—Mummert-Dixon Company, Hanover, Pa. Folders No. 485 and 490. The first treats of a machine shop oil stone grinder with two wheels mounted on the front arbor. By tilting the table backward and fastening a V-block, the tool can be used as a good drill grinder. Folder No. 490 illustrates a combined crane and floor grinder which is a grinding stand combined with a power jib crane. The hoist is operated by power and the raising and lowering is controlled by a conveniently located lever. Provision is also made for operating the hoist by hand. Illustrated descriptions of the machines appeared in *The Iron Age*, May 8 and June 26, 1913, respectively.

Structural Steel Column Crane and Fuel Oil Burner.—Production Engineering Company, 1716 Spring Garden street, Philadelphia, Pa. Two loose leaf circulars. One illustrates a crane designed for light lifting which swings all the way round a building column and runs on ball bearings both at the top and bottom. The other calls attention to the Peco fuel oil burner with which it is claimed any temperature desired up to 3800 deg. F. may be obtained. It can be operated on oil or steam pressure up to 120 lb. A table giving the average heating value per pound of various commercial fuels is appended.

Steam Line Insulation.—Armstrong Cork Company, Pittsburgh, Pa. Pamphlet. Treats of and illustrates a special material for the installation of steam lines, made from diatomaceous earth. This product is claimed to have high insulating efficiency, that it will withstand repeated wetting and drying without injury and also high temperatures without disintegration. Methods of installation and supporting round lines are illustrated. A scientific method of testing insulating machines is shown and formulas for working out the efficiency of heat insulations are given and worked out.

Conveyor Belts.—B. F. Goodrich Company, Akron, Ohio. Pamphlet. This is the first of a series of pamphlets treating the construction, installation and operation of the conveyor belts manufactured by this company. In the first bulletin is mention of a number of well-known companies which are using these belts. It also calls attention to large shipments made abroad; for example, 24,000 ft. to the Transvaal for use in gold mines.

Iron and Steel Products.—Brown-Walke Company, Boston, Mass. "Silent Salesman and Handbook." Gives full information regarding the stock of iron and steel products carried in the company's warehouses, situated at C, Fargo and Egmont streets, Boston. The book is of pocket size and comprises 68 pages.

Contractors' Equipment.—Standard Scale & Supply Company, 243 Water street, Pittsburgh, Pa. Catalogue No. Y-1. Pertains to the Standard line of contractors' equipment, which includes scales, concrete mixers, steam engines and boilers, gasoline engines, hoists and elevators, pumping outfits, wagons, cars, scrapers, wheelbarrows, carts, trucks, etc. All of these are illustrated and briefly described, and in a number of cases views are given of the various pieces of equipment in use. Among the equipment listed is a low charging concrete mixer which was illustrated in *The Iron Age*, April 8, 1909.

Brazing Table.—Improved Appliance Company, 455 Kent avenue, Brooklyn, N. Y. Bulletin No. 210. Illustrates a cast-iron brazing table, with removable center and front sections. It has a gas consumption up to 200 cu. ft. per hr. per burner and has wired hose for gas and air. Attention is called to the readiness with which a forge or a furnace of any shape may be made with the table and a few fire bricks. Various other practical uses of the apparatus are mentioned. The table was illustrated in *The Iron Age*, July 3, 1913.

Voltage Regulation System.—General Electric Company, Schenectady, N. Y. Bulletin No. 4972. Describes the KR system of voltage regulation, to be used on systems having large fluctuations of voltage. It comprises a booster, with an automatic regulator, so arranged as to continually reverse the excitation of the booster, but with varying periodicity. This system is claimed to give a broad range of excitation and that the voltage furnished the fields of the main alternators is not limited by the voltage range of the main exciters or the amount of current flow interrupted by the contact of the regulator. The theory of the system is analyzed and a diagram illustrating its application is shown.

Chains and Sprockets.—Union Chain & Mfg. Company, Seville, Ohio. Pamphlet. Calls attention to the company's steel chain, which has links stamped in one piece, without riveting. The joints are claimed to be practically dust proof. Among other features is mentioned that the straddle-milled bushings and connecting pins, when worn, can be turned over half way, bringing into service the unused wearing surface. The chain is said to be adapted for conveying purposes, holes in the bridges permitting conveyor belts, etc., to be secured. Mention is made of chains for motor-trucks, machine tools, etc., and pressed sheet case-hardened sprockets. An illustrated description of this chain appeared in *The Iron Age*, August 21, 1913.

Belt Treatment.—Cling-Surface Company, 1032 Niagara street, Buffalo, N. Y. Bulletin. Illustrates and describes tests on belts at different arcs of contact and at varying tensions untreated and treated with Cling-Surface.

Industrial Railway Track and Equipment.—Orenstein-Arthur, Koppel Company, Koppel, Pa. Illustrated catalogue. Size, 8 1/4 x 10 1/4 in.; 84 pages. Gives a comprehensive view of the company's products, including a wide range of rails, portable tracks, switches, track accessories, turntables, cars, steam and electric locomotives and a special excavator. Among other interesting features is a cast plate track, made for shop and boiler room installation. The rails are cast solid with a level checkered surface plate, which is made in interlocking sections.

Crucible Tongs and Form.—E. R. Klemm, 1447 Austin avenue, Chicago, Ill. Folder. Illustrates crucible tongs designed to prevent squeezing on the soft crucible and giving ample room for the top of the crucible rim. The tongs are fitted with links for a chain hoist. The crucible form is made in the shape of a crucible of cast iron and is intended to be used as an anvil and to simplify the reshaping of crucible tongs. In reforming, the tongs are clamped to the iron crucible and hammered into shape. The crucible forms are made to match various sizes of graphite crucibles.

Reamers.—Gisholt Machine Company, Madison, Wis. Illustrated catalogue. Treats of the Gisholt adjustable reamers, the blades of which are made of flat, wide stock. The body is made from unhardened high carbon steel and the reamer body is said to retain the rigidity of one having a solid body. The blades are few in number, and when worn below size may be restored to standard easily. Shell and taper shank arbors are illustrated. Directions for the sharpening, use and adjustment of reamers are given.

Electric Drag, Steel Mill Trolley and Crane Motor.—Shaw Electric Crane Company, Muskegon, Mich. Manning, Maxwell & Moore, 119 West Fortieth street, New York City, general sales agents. Bulletins No. 82, 91 and 109. The first illustrates a single-drum portable electric drag, designed for handling cars in freight sheds or repair shops, as a portable winch or as a stationary hoist. The winding drum is of cast iron, machined with grooves to keep the hauling cable in place. The motor is the company's standard type Z crane motor. The machine can be altered to meet special requirements. Bulletin No. 91 relates to the type M trolley designed for steel mills. The trolley structure is steel throughout and consists of heavy side frames, connected by two rugged girts, one carrying the hoist motor and electric brake and the other the motor. Standard safety devices are installed when specified. Bulletin No. 109 illustrates and describes the company's type Z crane motors. These motors are series wound and magnetic circuits are liberally proportioned, developing high starting torque and giving a wide range of speed. The cast-steel frames are split diagonally and when assembled with bearings completely inclose the motors.

Steam Turbines.—General Electric Company, Schenectady, N. Y. Bulletin No. A-4137, superseding No. 4845 A. Illustrates and describes Curtis steam turbines of 100 to 2500 kw capacity. These sets are of the horizontal shaft, rigid frame type, with either two or four impulse wheels. The shaft packing is steam sealed and is claimed to be capable of maintaining a high vacuum indefinitely. Among other features, attention is called to the steam admission valves, operating in sequence, which are said not to throttle or wire draw the steam. Besides a centrifugal-inertia governor, an emergency governor is supplied. The bulletin is well illustrated, showing details of turbine construction, path of steam flow, and a number of typical installations.

Hack Saw Machines.—West Haven Mfg. Company, New Haven, Conn. Bulletin. Illustrates a line of power-driven hack saw machines which are designed to compete with circular sawing machines. Among other features is mentioned the lift on the return stroke, which is accomplished by an oil ram, worked by an eccentric, the piston of which closes its own port at the end of the cutting stroke, lifting the blade and slowly letting it down on the work at the end of the idle stroke.

The Machinery Markets

In all of the important machinery manufacturing and selling centers there is a continuance of the slackened activity which was noted a week ago. In two or three cities a betterment in inquiries is discerned, but on the whole additions to facilities in manufacturing plants and their improvement are temporarily checked. In New York the inactivity of buyers is credited to a desire to know more as to the operation of the new tariff. If there has been any change in New England it has been in the form of an improved volume of inquiries, but the trade generally is inactive. Small orders are the rule in Philadelphia, with buying of shop equipment by the railroads at a standstill, although there has been a fair movement in power equipment. Dullness continues in Cleveland, but the feeling as to the future is improved. In Cincinnati opinions are varied as to the prospect for better business, but a majority of the trade holds that activity will pick up now that the tariff bill has passed; present conditions are dull. The feature in Detroit has been the purchase of a large list of machine tools by the Ford Motor Company and there is a fair amount of business in prospect, but otherwise trade is dull. In Chicago dullness is sustained, with no railroad buying and not much on the part of industrial companies. Inquiries have appeared in better volume in Milwaukee. While there is no pressure in filling orders in the Central South, an average fall season is looked for. Dealers are reasonably satisfied in St. Louis, although there have been no large individual orders. Birmingham is feeling the benefits of proceeds from the sale of cotton, which is commanding a good figure. In Texas all lines have been depressed by heavy rains which have inflicted great damage to crops, bridges and highways. On the Pacific coast purchases have been mostly of small tools for garage and repair works, although better inquiry is coming from the mines and industrial plants. In that territory the increase of motor-driven agricultural equipment is creating a need for more extensive repair facilities.

New York

NEW YORK, October 8, 1913.

Trade conditions in machinery lines are colorless in this market. It is admitted by all that business is quiet, but no complaint is heard. Leading houses say that September was not as good as August and that present conditions show no improvement beyond a better activity in second-hand machine tools, which is satisfactory in its way. The trade is devoting itself to small and scattered inquiries, but some of these show no indication of early closing. The entire situation is summed up by the statement that buyers are "marking time" because of their desire to know more as to the actual working of the new tariff.

The Moline Plow Company has secured a permit for an addition to the foundry of the Adriance-Platt plant at Poughkeepsie, N. Y., to be 65 x 133 ft., one story, of brick and steel. The company also plans the construction of a steel and brick pattern storage building, 30 x 98 ft. The total building operations of the Moline Plow Company at the Adriance-Platt works will aggregate \$263,000 for this year and still more extensive building is expected next season.

The McConnell Coal & Ice Mfg. Company, Garrison avenue and Bronx River, New York, is taking bids on the contract for a two-story brick ice plant, 130 x 150 ft., to be erected at its present location. Frank Wenemer, 2316 Honeywell avenue, prepared the plans for the plant, which will cost about \$90,000.

The Foote Mfg. Company, Hunda, N. Y., maker of concrete mixers, is taking bids for the erection of an addition to its plant to be 100 x 300 ft., brick and structural steel construction.

The International Safety Appliance Company, Syracuse, N. Y., has been incorporated with a capital stock of \$50,000 to manufacture appliances for fire protection. W. H. Tibbal, T. K. Smith and S. G. Daley, Syracuse, are the incorporators.

A new mill is being erected by the Northern New York Marble Company at Gouverneur, N. Y., to replace the mill destroyed by fire last winter. Electric equipment to operate the machinery and light the plant will be installed.

The factory of the American Fruit Products Company, Barker, N. Y., was entirely destroyed by fire October 3. D. M. Pettingall, president, of Halley, N. Y., states that the plant will be rebuilt and equipped at once.

The Wayland Electric Light & Power Company, Wayland, N. Y., is in the market for additional transformers and one 100-kw. three-phase 2200-volt generator.

Plans are being prepared by H. L. Sterling, engineer, Newburgh, N. Y., for the construction of a waterworks system at Wappingers Falls, N. Y.

The board of contract and supply, Binghamton, N. Y., is receiving bids for the erection and equipment of a heating and power plant building in connection with the new high school to be built this fall.

The Husted Milling Company, Buffalo, is having plans completed for a fireproof feed mill and elevator of reinforced concrete construction to replace that portion of its plant at Elk street and the New York, Chicago & St. Louis Railroad which was recently destroyed by fire.

The Aluminum Castings Company, Buffalo, is building a one-story brick and tile addition to its plant at Elmwood and Hertel avenues and the Erie Railroad.

The Cyphers Incubator Company, Buffalo, is building a two-story addition to the power house at its plant at Dewey avenue and the New York Central Railroad Belt Line.

A four-story fireproof packing house is being added to the plant of the Danahy Packing Company, Clinton and Metcalfe streets, Buffalo.

The Cloverleaf Milling Company, Buffalo, whose plant was recently burned, has purchased the plant of the Victor Truck Company, 70 x 300 ft., at Military road and the Niagara Falls division of the New York Central Railroad, North Buffalo, and will equip it for use as a feed mill. Donald B. Fraser is president.

The Steul & Thuman Company, Buffalo, has let the contract for a dry kiln and addition to its mantel factory at Johnson and Genesee streets.

The Medina Cold Storage Company, Medina, N. Y., recently incorporated, is building a cold storage plant 57 x 127 ft. and will next spring build and equip an addition, 80 x 200 ft., two stories.

The Rochester Motors Company, Rochester, N. Y., has acquired the plants and equipment of the Rochester Electric Motor Company and the F. A. Brownell Motor Company and will continue manufacturing the line of direct-current dynamos, motors, automobile motors and transmission made by the former companies. The management of the new company will be the same as that of the Rochester Electric Motor Company.

Elwood Johnson, Lakewood, N. J., has bought the property formerly occupied by the Barry Lumber Company at Main street and Fifth avenue and proposes to erect a building for the manufacture of ornamental cement work, including a patented broken-face block.

A three-story brick factory and a power house will be built by the American Machine & Foundry Company, Brooklyn, on a site recently purchased on Fifty-fifth street.

Work has been commenced on addition, 63 x 154 ft., two stories, to be made to the plant of the Utica Steam Cotton Mills, Utica, N. Y.

The Imperial Wall Paper Company, Glens Falls, N. Y., has let the contract for the erection of a factory building, 65 x 200 ft., three stories and basement, to replace a building recently destroyed by fire.

New England

BOSTON, MASS., October 7, 1913.

If any change has taken place in the machinery business it is for the better. A few houses report some improvement in the last few weeks to a certain extent in actual orders, but more in inquiries. However, the trade generally is inactive. Users are holding back with projected improvements. Few shop extensions are reported. In fact the building trades everywhere are dull. The influx of second-hand equipment into the market is an influence which is responsible to some extent for present conditions. A vast amount of machinery, much of it of a high class, has either been delivered to users or dealers recently or will be in the near future, and this cannot fail to have an effect on the market for new tools. It remains a significant fact that many of the customers of machinery houses are really busy. The depression is more or less confined to the equipment trades.

The textile machinery builders are moderately busy. Times are not by any means booming, but conditions are not much under normal. They are much better than might be expected if the commonly made statement as to the effect of the new tariff on American textiles is not exaggerated. The demand for silk-making machinery is almost phenomenal. The shops are operating at top production in their attempts to keep up with orders. The cotton machinery trade is moderately active. Woolen machinery is in small demand, but this has been the case for several years. To-day, however, replacements of antiquated equipment are being made in order to meet European competition. The demand for all kinds of automatic textile machinery is heavy because these machines counteract to a greater or less degree the difference in cost of labor here and abroad.

Charles E. Thwing, Worcester, Mass., has brought out an 11-in. engine lathe which he has begun to place on the market. His headquarters are the office of the Whitcomb-Blaisdell Machine Tool Company. For the present Mr. Thwing will have the machine built for him. It is designed for general machine shop purposes.

George H. Du Paul, Southbridge, Mass., manufacturer of optical goods, will erect a factory 45 x 75 ft., two stories, of brick.

The Norton Company, Worcester, Mass., has awarded the contract for a one-story storage building 46 x 144 ft., of concrete and brick.

The Maine Central Railroad has decided to reopen repair shops at Somerset, Maine, which were shut down about two years ago and the work transferred to Waterville.

The Mount Carmel Brass Foundry, Inc., Mount Carmel, Conn., which was recently organized under a Connecticut charter, will operate a new foundry which will specialize on brass and bronze castings for the plumbing trade, though other business will be accepted. Raffaele Biondi is the president and Albert Pfeiffer the secretary and treasurer.

The Lombard Machine Company, Leicester, Mass., manufacturer of textile machinery, will move its shops to a building at Stafford and Heard streets, Worcester, Mass. The change is due to the need of increased manufacturing space.

Foster, Merriam & Co., Meriden, Conn., are planning a large addition to their foundry.

The Cambridge Brass Company, Sudbury street, Boston, manufacturer of gas and electric lighting fixtures, has leased a factory at Fulton and Valley streets, Medford, Mass., where it will establish its manufacturing.

Word from New Bedford, Mass., has it that the Union wharf property in the neighboring town of Fairhaven has been purchased by Edward L. Besse and that a foundry will be erected on the premises.

The Hartford Machine Screw Company, Hartford, Conn., will increase its works by adding a story to a one-story building 60 x 100 ft.

The Lovell Engine Company, Hartford, Conn., has been incorporated with a capital stock of \$50,000 to manufacture automobile engines, a business which has been conducted in Boston by A. W. Lovell. The incorporators include Daniel M. Wright, of the Henry & Wright Mfg. Company, and Fred W. Stickle, of the Capitol Foundry Company, of Hartford, and Mr. Lovell. It is purposed to build a factory at Hartford.

The Universal Safety Tread Company, which has plants at Groton, New York, and Boston, Mass., has purchased a site at Rumford avenue and Buttrick street, Waltham, Mass., and is erecting a one-story concrete building to which it will remove its present plants. The company manufactures the Universal safety tread, made from steel or brass, with lead or lead and alumi-

num, and another tread having an abrasive base and a special cement filling. Details as to equipment are not available. Thomas T. Booth, Worcester, Mass., is president; Frederick W. Langford, 141 Milk street, Boston, Mass., is general manager, and Colby J. Bassett, Boston, treasurer.

Philadelphia

PHILADELPHIA, PA., October 6, 1913.

With a number of makers and sellers of machinery September was about the slowest month of the year. Prospective buyers lacked interest and orders came out slowly, this being in a measure due to the uncertainty as to the duties to be levied under the Underwood-Simmons tariff, just passed. The proposed currency legislation has also tightened purse strings, and contemplated improvements and expansions have been held in abeyance. Practically all the new business is of small single tool character. Railroad buying of machinery equipment in this district is at a standstill. A fair movement continues in power equipment. Gray-iron jobbing and machinery casting foundries are fairly well engaged, although little new machinery work comes out. Steel-casting plants continue to operate on an irregular basis. The second-hand machinery market is dull. Very little business is moving in the export trade.

The Baldwin Locomotive Works has received orders for 100 freight locomotives from the Pennsylvania Railroad Company, 50 for lines east and 50 for lines west of Pittsburgh. An order for 144 locomotives was placed with the Baldwin Works by the same road earlier in the year. The Baldwin Works is operating at about 85 per cent. capacity, employing 15,000 workmen, as compared with 18,000 when operating at full capacity.

John T. Windrim, architect and engineer, is said to be preparing plans and specifications for a one-story brick machine shop, to be erected in West Philadelphia, for the Philadelphia Electric Company. Details are not yet available.

The Eveland Electric Riveter Company, Camden, N. J., has been incorporated with a capital stock of \$10,000 to engage in manufacturing. The company is closely identified with the Eveland Engineering & Mfg. Company, Twenty-third and Market streets, this city. S. S. Eveland, E. A. Reeve and J. A. MacPeak are the incorporators.

Charles J. Brooks, architect, Camden, N. J., is preparing plans for a three-story factory building for the Gausler & Starr Company, of that city. The building will be 60 x 200 ft. The architect is not yet prepared to give details.

The H. K. Wampole Company, manufacturer of pharmaceutical preparations, has given a contract for the erection of a six-story addition to its plant at 420 Fairmount avenue, Philadelphia. Metal sash will be used.

It is stated that the A. Mecky Company, 3631 Smedley street, Philadelphia, manufacturer of small wagons and vehicles, has had plans completed by the N. K. Bugbee Engineering Company, Trenton, N. J., and is ready for bids for a one-story brick factory building, 80 x 350 ft., to be erected on Whitehead road in the latter city, which is to be used in addition to its present plant.

The foundry and manufacturing plant of the Jones & Bixler Mfg. Company, Freemansburg, Pa., together with its equipment, will be sold at public auction October 11. The plant was one of the subsidiaries of the Hardware & Woodenware Mfg. Company, and was used for the manufacture of iron toys and light castings.

It is reported that the Penn Shear Company, Reading, Pa., contemplates the erection of a two-story manufacturing building, 50 x 125 ft., on Richmond street, in that city, and that bids for its construction will be taken in the near future.

Charters have been granted the Eastern Pennsylvania Light, Heat & Power Company to operate plants in Ryon, Centralia, Girardville, Butler, Gilberton, Conyngham and West Mahanoy townships, Schuylkill County, and the Edison Illuminating Company, Easton, Pa. These charters were granted to officials largely of the Lehigh Valley Transit Company, following that company's policy of controlling power plants in the territory through which it operates.

The Stone Harbor Ice & Bottling Company, Stone Harbor, N. J., is having plans and specifications prepared for a two-story fireproof refrigerating and bottling plant to be erected in that city.

The Universal Clamp Company, Wilkes-Barre, Pa., has been incorporated with a capital stock of \$25,000. Harry Murphy, Wilkes-Barre, Pa., is named as incorporator. Details are not yet available.

Plans are being prepared by J. & M. Kennedy, architects, Wilmington, Del., for a two-story brick factory building, 60 x 80 ft., to be erected at Second and Greenhill streets, in that city for the Wilmington Leather Company. It is stated that bids will be asked at an early date.

Cincinnati

CINCINNATI, OHIO, October 6, 1913.

There is quite a difference of opinion among local manufacturers as to the probable effect of the new tariff law. However, the majority of them seem to think that, as the question is now finally settled, domestic business will pick up materially in almost all lines. While the question of foreign competition is considered a serious one by many, no trouble of moment is looked for from this source for some time to come. The machine tool trade is slow and while there are rumors of railroad buying, this section has not been materially benefited lately by this class of customers. The foundries are not as busy as they should be, and many of them are operating with materially reduced forces. There is no change in the second-hand machinery business, which continues dull.

Bert L. Baldwin & Co., mechanical engineers, Cincinnati, have been appointed to design and superintend the installation of all the mechanical equipment for the new court house. This includes the heating, lighting, ventilating and power plants, and the estimated cost for the equipment is \$250,000. Bids will not be asked for until about January 1.

The Schacht Motor Car Company's stock of Invincible automobiles, accessories and parts, and its entire outfit of metal and woodworking machinery, tools, etc., will be offered by the receiver at auction, Monday, October 20, at 10 a. m., on the company's premises, 4851 to 4887 Spring Grove avenue, Winton place, Cincinnati. The Ezekiel & Bernheim Company, 334 Main street, Cincinnati, will act as auctioneer.

The Cincinnati Rubber Mfg. Company, Cincinnati, will make an addition to its power plant, 30 x 50 ft., one story, of brick construction.

The Cullen & Vaughn Construction Company, Hamilton, Ohio, has absorbed the Bender Company, contractor and builder, of that city. Both companies make a specialty of erecting buildings.

The Cincinnati Brewing Company, Hamilton, Ohio, has let the contract for another addition to its ice plant. It has already provided for a 225-ton Triumph refrigerating machine, but will need a small amount of additional equipment.

The Excelsior Laundry Company, Dayton, Ohio, will erect one of the largest plants of its kind in this vicinity. The plans call for a three-story building, of reinforced concrete construction. Power and other equipment will have to be provided for.

The Dayton Power & Light Company, Dayton, Ohio, is having plans prepared for another power house, in addition to the one recently mentioned. The company is cooperating with the city authorities in an endeavor to electrify the business and manufacturing districts, and in this way partially eliminate the smoke nuisance.

Considerable structural material will be required for a large reinforced concrete warehouse to be erected by the Fireproof Warehouse Storage Company, Columbus, Ohio.

The Columbus Show Case Company, Columbus, Ohio, has awarded contract to J. B. Powell, a Columbus contractor, for the large addition to its plant, recently mentioned. Part of the equipment, including the heating plant, has already been purchased.

The Excelsior Shoe Company, Portsmouth, Ohio, is buying machinery for its new plant that is now in the course of erection.

Butler Brothers, Glendale, Ohio, will construct the new factory of the Gedge-Gray Company, Lockland, Ohio. As was announced some time ago, the company intends moving its woodworking plant from Hamilton, Ohio, to the location mentioned.

W. T. Holmes, clerk, board of education, Springfield, Ohio, will soon have plans in his possession for a foundry and forge shop addition to one of the city's public schools.

Work will be commenced next month on the electric lighting plant to be constructed by the Mansfield Gas Light Company, Mansfield, Ohio, recently men-

tioned. Part of the power plant equipment has already been bought.

The Ashland Mfg. Company, Ashland, Ky., has been incorporated with \$60,000 capital stock, to manufacture waterproof material. Nothing is known as to equipment requirements. D. H. Putnam is one of the incorporators.

The Star Laundry Company, Third and Main streets, Covington, Ky., will require some special equipment for a new laundry for which the contract has been let. George Cleancy is manager.

The Reliable Safe & Lock Company, Covington, Ky., has been incorporated with \$50,000 capital stock to manufacture and deal in safes, vaults, etc. Nothing has been given out as to manufacturing plans. George A. Hattersley, Norwood, Ohio, is one of the principal promoters.

Cleveland

CLEVELAND, OHIO, October 6, 1913.

The machinery market continues dull. There is some scattering buying in single tools, but very few larger sales are reported and no new lists have come out. However, the feeling among dealers seems to be somewhat better than a month ago. There is considerable hesitancy among the large users of machinery about placing orders. Little business is coming from the railroads. The Lake Shore Railroad list, which came out several weeks ago, is still pending. The Otis Steel Company is reported to have purchased three of the machines contained in its list published last week. Quite a number of new manufacturing plants in metal working lines are being planned in this city, which will later require some machinery. Inquiry for second-hand machinery has somewhat improved.

The Osborne-Crew Mfg. Company, Cleveland, has been incorporated with a capital stock of \$10,000 by Fleming Crew and others to manufacture steel pulleys.

A new manufacturing plant will be erected on West 112th street, Cleveland, by L. and A. Friedman, in which will be located two manufacturing plants in which the builders are interested: The Cleveland Heater Company, maker of the Rex water heater, and the Cleveland Speed Indicator Company. The building will be a one-story fireproof structure, 100 x 250 ft., with saw-tooth roof.

The Cleveland Motor Lamp & Radiator Company, Cleveland, has been incorporated with a capital stock of \$10,000 by W. H. Montie, J. L. Ballash, E. E. Keisler and others.

The Ohio Foundry Company, Cleveland, has placed a contract for the erection of an addition adjoining its present plant. It will be two story, brick, and will be used for assembling purposes.

The K. W. Ignition Company, Cleveland, will enlarge its plant by the erection of two one-story buildings, each 60 x 125 ft., of brick and steel construction.

The White Automobile Company, Cleveland, will enlarge its plant by the erection of a one-story addition, 30 x 240 ft.

The Remo Pipe Cleaner Company, Cleveland, has been incorporated with a capital stock of \$25,000 by Geo. E. Meyers, E. F. Smith and others to manufacture pipe cleaning machines.

The Cleveland Wrought Washer Company will enlarge its plant at 3590 West Thirty-eighth street by the erection of a one-story and basement building, 86 x 100 ft. The company's present quarters are inadequate for its business and the additional room will give it further opportunity for growth. Some new machinery will probably be installed.

The Massillon Foundry & Machine Company, Massillon, Ohio, has increased its capital stock from \$100,000 to \$200,000.

A new four-story concrete plant, 40 x 120 ft., is being built by the Champion Spark Plug Company at Avondale and Upton avenues, Toledo, Ohio.

The Radial Mfg. Company, Toledo, has been incorporated with a capital stock of \$10,000 by Rathbone Fuller, John H. Taylor and others. The company will make milk machinery.

The Fulton Drop Forge Company, Canal Fulton, Ohio, has been incorporated with a capital stock of \$100,000 by W. C. Laiblin, C. A. Erwin, H. D. Pownall, William Stuart and A. M. McCarthy.

The Champion Hardware Company, Geneva, Ohio, has purchased the old electric lighting building in that place which will be enlarged and used as a gray-iron foundry. The company at present has only a brass foundry.

The Deming Company, Salem, Ohio, manufacturer

of pumps, has increased its capital stock from \$150,000 to \$250,000.

The Delphos Foundry, Delphos, Ohio, is being enlarged by the erection of a new building, 32 x 60 ft.

The Schaffer Engineering & Equipment Company, Tiffin, Ohio, has been organized to carry on a general engineering business. John C. Schaffer is at the head of the company. Its offices are in the Spayth Building, Tiffin.

Wheeling

WHEELING, W. VA., October 6, 1913.

The Charles Bolt Glass Company, Cincinnati, Ohio, has secured 10 acres of land in this city for the purpose of erecting a modern glass plant at a cost of \$600,000. The factory will consist of six furnaces, built especially to operate the Owens 15-armed bottle machines.

The Neuralgylne Company, Wheeling, W. Va., has taken out a permit to erect a five-story reinforced concrete building to be used for manufacturing, storage and office purposes to cost \$100,000. H. F. Behrens is president.

The Raleigh Coal & Coke Company, Raleigh, W. Va., is building an electric power house, 36 x 36 ft., which will be equipped with electric motors amounting to 2500 hp.; machine shops, 40 x 125 ft., and 40 x 60 ft., and is making other extensive improvements.

The Pocahontas Foundry & Machine Company, Keystone, W. Va., has been incorporated with \$25,000 capital stock by K. M. Bright, J. B. Purcell, T. F. Henritze, of Lake Brinkley, W. Va., and J. Graham Sale, of Welch, W. Va.

The Island Creek Block Coal Company, Logan, W. Va., has been incorporated with \$25,000 capital stock by E. A. Anthony, L. O. Deaumer, J. Carey Alderson, G. A. Washington and R. L. Shrewsbury, of Logan, W. Va.

The Welch Ice Company, Welch, W. Va., has been incorporated with a capital stock of \$100,000 by J. P. Swanson, J. F. Rison, of Danville, Va.; H. E. Cartland, Claude Kiser and George Hart, of Greensboro, N. C.

Stuart & James, engineers, Bluefield, W. Va., are drawing plans for the electrification of the coal fields of eastern Kentucky and Tennessee along the lines of the Louisville & Nashville Railroad, and the coal fields of southwest Virginia along the lines of the Norfolk & Western Railroad and the Carolina, Clinchfield and Ohio Railroad. The enterprise will probably require the establishment of at least three steam operated central plants located at mines throughout the section to be served.

Henry Jacobs and L. Dashner will establish an automobile garage and repair shop at Point Pleasant, W. Va.

The Novelty Clay Forms Company, Newell, W. Va., has been incorporated to manufacture clay products with a capital stock of \$25,000 by George S. Howard, J. A. Newell, of Newell, W. Va., and others.

Indianapolis

INDIANAPOLIS, IND., October 6, 1913.

Negotiations are on between the Beech Grove Improvement Association, of Beech Grove, a manufacturing suburb of this city, and the J. A. Fay & Egan Company, woodworking machinery manufacturer, Cincinnati, for the removal of its plant to Beech Grove, where the New York Central Railroad has large shops. It is said the 18 acres occupied by the company at Cincinnati have been condemned for railroad purposes. The proposal is to give the company a site of 60 acres and a bonus of \$170,000 in cash, which will be raised by the selling of lots in the suburb.

The Eli Lilly Company, of this city, manufacturing chemist, has let contracts for additions to its plant at Greenfield, Ind., to cost \$100,000.

The Time Shop & Light Machinery Specialist Company, Indianapolis, has been incorporated, with \$6000 capital stock, to manufacture time pieces and other small machinery. The directors are A. A. Clark, F. W. Sumner and G. M. Clark.

The Electric Steel Company of Indiana, Indianapolis, has been incorporated, with \$100,000 capital stock, to manufacture steel products. The directors are H. McK. Landon, H. H. Buckman, Jr.; G. A. Weidley, J. D. Forrest and Chester P. Wilson. The company

will make steel castings, ferroalloys, etc., by electrical processes, under patents controlled by Mr. Buckman. The output of the factory will be about 6 tons a day and the high-grade castings will be used principally by local automobile manufacturers. The company is negotiating for the employment of J. M. Ryan, recently of the steel-casting department of the Canadian Steel Foundries, Ltd. The organization of the company is in the hands of W. W. Dark. Two or three sites for the plant are under consideration. The directors are connected with local automobile and coke manufacturing plants, principally.

John W. Herron, Jr., president of the company, and Philip C. Hinkle have been appointed receivers for the Royer Wheel Mfg. Company, Aurora, Ind., which was damaged to the extent of \$75,000 loss by the March floods. The plant will be continued in operation.

The Evansville Furniture Company, Evansville, Ind., has increased its capital stock from \$50,000 to \$150,000.

The Armfield & Cartwright Stone & Lime Company, Portland, Ind., will build a gas-making and lime-burning plant.

The Brazil Can Company, Brazil, Ind., has changed its name to the Brazil Stamping & Mfg. Company.

The Fletcher Enamel Company, Anderson, Ind., manufacturer of enameled ware, is erecting a building at Harrison, W. Va., 260 x 260 ft. The building will be of brick with steel roof construction. Detailed information as to machinery equipment is not yet available.

The corporation of Bertsch & Co., Cambridge City, Ind., maker of presses, punches, shears, etc., has increased its preferred stock \$10,000 in order to purchase more machinery.

The Monarch Broom Company, Evansville, Ind., will be in the market for special machinery to take the place of that which was destroyed in a recent fire with \$10,000 loss.

Milwaukee

MILWAUKEE, WIS., October 6, 1913.

Nothing of particular importance in the way of new orders of any considerable size is reported, although inquiries are reappearing in greater volume, and buyers who have been holding off seem more inclined to act. Tool business continues good and shops are busy. The heavy machinery builders report business fairly satisfactory. Metal tradesmen generally are somewhat more cheerful than for some time.

H. C. Koch & Sons are preparing plans for a factory building, 90 x 120 ft., six stories, to be erected by the Ticonic Investment Company at Huron and Jackson streets, Milwaukee, at a cost of \$200,000.

The Wisconsin Motor Mfg. Company, Milwaukee, has recently booked large contracts with several additional automobile manufacturers and may take up an enlargement programme next spring. The company has been a steady buyer of tools and milling machines for some time and has about reached the limit of its space. Charles John is president and general manager.

Work on the new plant of the Davis Mfg. Company, Milwaukee, manufacturer of motors for tractors and motor vehicles, gasoline railroad cars, etc., is progressing satisfactorily, the contractor having started on the superstructure. The new plant will be located between Milwaukee and West Allis, and on its completion the Davis Company will abandon its shops at Fifteenth avenue and Park street, in the Menominee Valley, which were built only a few years ago and have now been sold.

The Laursen Automatic Pump Company, Eau Claire, Wis., has recently booked several large orders for pumps and is working at full capacity. The Merrilan Milling Company, Merrilan, has purchased two 100,000 gal. pumps and the Green Bay & Western and Omaha railroads have contracted for a 360,000 gal. pump for the joint water supply station at Merrilan.

The Harvey Spring Company, Racine, Wis., which has recently completed a large new factory building for the manufacture of springs and axles for wagons and motor vehicles, has increased its capital stock from \$50,000 to \$300,000.

W. F. Woods, La Crosse, Wis., who early this year bought the majority interest in the Chicago Steel Tape Company, of Chicago, and moved the works to La Crosse, has now incorporated the Chicago Steel Tape Company, of La Crosse, with a capital stock of \$100,000. The company is occupying leased quarters and intends to build next spring.

The Beaver Dam Malleable Iron Range Company, Beaver Dam, Wis., is about to expend from \$50,000 to

\$75,000 in enlarging its works, which are already among the largest devoted exclusively to the manufacture of ranges in the United States. Work will begin at once, and it is the intention to carry building operations through in the first half of next year. A two-story brick and mill construction addition will be made to the present main shop and the new warehouse will be enlarged with a wing, 35 x 60 ft. A new muffle furnace for treating castings will be installed and additional foundry accommodations are included in the plans. The railroad companies have agreed to increase trackage facilities. It is planned to replace all frame dwellings with brick structures.

The Diesel type engine purchased by the city of Appleton, Wis., mentioned last week, is of 225 brake hp., made by the Power & Mining Machinery Company, Cudahy, Wis., for the Busch-Sulzer Bros. Diesel Engine Company, St. Louis, Mo., and was ordered through the Langstadt-Myer Construction & Supply Company, Appleton, which has general contract for the waterworks at Appleton.

Detroit

DETROIT, MICH., October 6, 1913.

The feature of the market the past week was the large list of tools purchased by the Ford Motor Company for the equipping of its plant to manufacture a variety of parts which have, in the past, been purchased from auto part makers. Otherwise the market has been dull, orders being light and of little individual importance. A fair amount of business is in prospect, but inquiry is not heavy enough to promise any material improvement. The second-hand machinery market is quiet. In some lines of special equipment, notably telephone equipment, a fair volume of business is moving. Sheet-metal stamping companies report a good volume of orders. The demand for both gray-iron and steel castings continues good. New work in building circles is abundant, but is not of a type particularly interesting to the machinery trade.

The Cadillac Motor Car Company, Detroit, has had plans prepared for a large storage building adjoining its plant. The company will considerably increase its output for the coming season and some new machinery will be installed.

The Wagenthals Motor Company, 668 Grand River avenue, Detroit, has reorganized, increasing its capital stock from \$100,000 to \$500,000, and is planning the acquisition of a new and larger plant. The directors are W. C. Wagenthals, William Pelum and C. F. Ayer.

It is announced that the Peter Smith Heater Company, Detroit, manufacturer of street car heaters, has purchased a large four-story factory building at 1735 Mt. Elliott avenue and will shortly occupy the new plant. The move will mean a considerable increase in the company's capacity.

The Universal Bottle Washer Company, Detroit, has been incorporated with a capital stock of \$100,000 to manufacture bottle washers. Philip Breitmeyer and Harry Grass are the principal stockholders.

The Batchelder Marble Company, Detroit, has taken out a building permit covering the erection of a one-story brick factory building, 30 x 50 ft., to cost \$10,000.

The General Motors Company, Flint, Mich., is preparing to establish a large foundry at Owosso, Mich.

The Independent Stove Company, Owosso, Mich., will enlarge its plant by the erection of an addition to its foundry of sufficient size to double its present capacity.

The Casnovia Dehydrating Company, Casnovia, Mich., has been incorporated with \$20,000 capital stock and will erect a plant for the production of evaporated vegetable products. James L. Norris and Frank R. Davis are among those interested.

The Albion Chemical Company, Albion, Mich., has outgrown its present quarters and a larger plant has been acquired. Some new equipment will be installed.

The Hinckley Milling Company, Alanson, Mich., has been organized to erect and operate a handle factory. D. H. and Louis Hinckley are the principal stockholders.

The A. B. Enameling & Foundry Company, Battle Creek, Mich., recently incorporated, will shortly begin the construction of a new foundry building, 103 x 244 ft., of brick and cement.

The taxpayers of Pontiac, Mich., have voted to issue \$35,000 bonds for the purchase of a new pump for the waterworks plant.

The Hess-Pontiac Spring & Axle Company, Pontiac, Mich., whose No. 2 plant was damaged by fire, as reported last week, advises that the larger machines were undamaged, except by water, and that the plant will be again in operation within two weeks. Pulleys, shafting and belting only will need replacement.

Chicago

CHICAGO, ILL., October 4, 1913.

The local machinery market appears to be passing through a period of sustained dullness in business, relief from which is still a distant prospect. Railroad buying is at a standstill and in every direction are evidences of delays in industrial expansion. The new Carter H. Harrison Technical High School at Chicago will soon be ready for the installation of the shop equipment, necessitating purchases of no small proportions. The University of Illinois at Urbana has recently installed some new machinery, including a precision horizontal boring, drilling and milling machine built by the Lucas Machine Tool Company, of Cleveland.

The Sanitary District, Chicago, has had plans prepared for a \$300,000 bridge to span the river at Jackson boulevard. An extensive power plant will be required for its operation.

The National Auto Maintenance Company, Chicago, has leased a two-story brick building, 90 x 100 ft., at 2511 South State street, which it will equip as an automobile and engine repair shop.

The Steelcrete Expanded Metal Company, Chicago, has been incorporated with a capital stock of \$2500 by Harvey B. Chess, Jr., Andrew C. Wylie and John C. Sheriff to engage in the iron and steel business.

The Ross Sleeve Motor Company, Chicago, has been incorporated for the manufacture of motors, engines, etc., with a capital stock of \$20,000 by F. W. Bull, E. Lundblad and A. S. Lytton.

The Standard Fender Company, Chicago, has been incorporated with a capital stock of \$250,000 by F. H. Escher, C. C. Jensen and M. J. Roberts.

The Cyclone Fence Company, North Chicago, will add another new structure to its plant, 126 x 160 ft.

The Klipfel Mfg. Company, Chicago, has purchased a site at the southeast corner of Harrison street and Washtenaw avenue for a three-story factory building.

The Vassar-Swiss Underwear Company is planning the erection of a three-story brick factory at 2722 North Maplewood avenue, at a cost of \$325,000. Address S. Hodges, Y.M.C.A. Building, Chicago.

Fire practically destroyed the plant of Miller, Hall & Son, bedstead manufacturers, 2535 West Taylor street, Chicago, on September 28, with a loss of about \$250,000.

The Viviano Bros. Macaroni Company, 116 South Green street, Chicago, is erecting a two-story brick factory at 2148 Canalport avenue, at a cost of \$115,000.

The Kimberly Mfg. Company, 80 East Jackson boulevard, Chicago, has been incorporated with a capital stock of \$2500 to deal in electrical appliances by Robert B. Clark, W. H. Beckman and Edgar J. Phillips.

The Universal Auto Supply Mfg. Company, 105 West Monroe street, Chicago, has been incorporated with a capital stock of \$50,000 by C. S. Tuttle, G. Burke and Joseph D. Irose, for the manufacture of machines, etc.

The Galesburg Malleable Iron Company's plant at Galesburg, Ill., was totally destroyed by fire on September 29, with a loss of \$30,000.

Bids will shortly be asked for the installation of a waterworks system at Matteson, Ill.

The Lynch-Jones Bedding Company, of Rockford, Ill., has been incorporated with a capital stock of \$10,000 by Alvin C. Jones, E. F. Tilley and Jos. P. Eames, and will equip a factory for the manufacture of mattresses, etc.

The New Monarch Glove Company, Olney, Ill., has been incorporated with a capital stock of \$50,000 by O. B., B. F. and O. G. Roney.

The Reinmiller Metallic Burial Vault Company, Atlanta, Ill., has been incorporated with a capital stock of \$12,500 by George Verry, B. I. Pumpelly and J. A. King to equip a plant for the manufacture of a patented burial vault.

The city of Winfield, Iowa, has voted a bond issue of \$15,000 for the installation of a waterworks system.

The Resilient Auto Wheels Company, Duluth, Minn., has been incorporated by Arthur Jutila, Helmer Johnson, Osmund Thompson and others, and will manufacture resilient automobile wheels and other appliances.

The Central South

LOUISVILLE, Ky., October 7, 1913.

Encouraging reports are being received from most machinery concerns. A fair amount of actual business has been noted and prospects are satisfactory. No rushing business is being taken care of, and few are optimistic enough to predict an unusually large fall trade; but a good average season is looked forward to, September having been just about that. The large number of municipal projects in this territory promises activity for manufacturers of power equipment, and a good many lines requiring special equipment are developing in satisfactory style. The distillery trade, which is a large consumer of machinery, will be less active this season owing to the high price of corn, but otherwise local trade conditions are good.

The Ferncliff Distilling Company has placed an order for a boiler with C. J. Walton & Sons and for drying equipment with the Louisville Drying Machine Company. A dry-house is now being built to receive the additional machinery.

The R. B. Tyler Company, Louisville, whose plant was recently destroyed by fire, advises that it is in the market for two 100-hp. boilers, one 150-hp. engine and air compressor, crusher, elevators and screens.

The Dow Wire & Iron Works, Louisville, has begun the construction of an addition to its foundry, but reports that no machinery will be needed, as the plant is being enlarged to give more room for the finishing department of the iron bed section of the plant.

Reinforced concrete will be used in the construction of buildings for the new Wood Mosaic Company, New Albany, Ind., which is rebuilding its veneer and flooring factory following a fire which destroyed the old plant. The special equipment is now being bought.

The Union Storage & Redrying Company, Lexington, Ky., will erect a warehouse and redrying plant in that city. Steam generating equipment will be needed. W. F. Land, L. M. Land and others are interested in the company.

Logan & Smith, Bowling Green, Ky., whose sawmill was recently burned, are considering plans for its reconstruction, and will need power and special machinery.

W. E. Cliver, Cincinnati, Ohio, is considering establishing a shirt factory at Lexington, Ky., to cost about \$30,000.

The Red Diamond Auto Line, Paducah, Ky., is considering establishing a garage and repair shop. M. R. Cherry, M. C. Anderson and O. L. Harton are interested.

The City Council of Danville, Ky., has authorized the construction of a new pumping station on Dix River, and will let a contract for the building and equipment in the immediate future.

The Clay County Land & Lumber Company, Pineville, Ky., which recently announced plans for the development of a large tract of timberland in eastern Kentucky, plans the construction of an electrically operated tramway to Barbourville, Ky., it is reported.

Avery H. Reed, Marion, Ky., is planning the establishment of a mill for grinding and cleaning fluorspar, which is produced in large quantities in Crittenden and adjoining counties in western Kentucky.

The Louisville & Nashville Railroad Company has begun the construction of a roundhouse at Irvine, Ky., and will be in the market for the necessary equipment in the near future.

J. W. Dawson, Winchester, Ky., and F. A. Byrd, Lexington, Ky., have purchased a tract of timber in Breathitt County, Ky., and are considering the location of a mill for developing the property.

George D. Selby, Portsmouth, Ohio, who has been considering enlarging his shoe factory at Ashland, Ky., is now planning to build an entirely new plant.

The Somerset Ice Company, Somerset, Ky., is planning to enlarge its facilities by the installation of equipment for cold storage and refrigeration.

The Eagle Cordage Mills, Covington, Ky., is in the market for a power baling-press. A used machine will be considered. It is to be used for heavy work.

The Walsh & Weidner Company, Chattanooga, Tenn., boiler manufacturer, has installed six 250-hp. boilers in the plant of the Great Eastern Lumber Company, located eight miles from Savannah, Ga.

The shops of the Gallatin Machine Company, Gallatin, Tenn., were burned October 3 in a fire which destroyed a large portion of the business section of Gallatin. Decision as to rebuilding has not yet been made.

J. D. Wyick, Knoxville, Tenn., is in the market for equipment for a sawmill. The machinery is to be delivered at Diboll, Texas, it is stated.

C. C. Guernsey is reported to be planning the establishment of a plant for the manufacture of wrenches at Columbia, Tenn. The board of trade of Columbia can give information regarding the project.

St. Louis

ST. LOUIS, Mo., October 6, 1913.

While dealers report no large individual orders coming in, they are reasonably well satisfied with the improvement, which is continuing, even though it be relatively small, as it indicates, from its character, that conditions are basically sound. All this territory seems to be well over the crop trouble, for it is quite well established from reports that for the most part the financial situation, so far as the crop return is concerned, will be pretty close to 1912 and practically equal to the 10-year average. Second-hand tools are in fair request. Collections are reasonably satisfactory.

The Rogers-Schmitt Wire & Iron Company, St. Louis, has begun the construction at 2301 Maiden Lane of a factory for the manufacture of ornamental iron and wire work. The building, to cost \$22,000, will receive considerable new equipment, in addition to that to be moved from the present quarters.

The Sanitary Sales & Service Company, St. Louis, has been incorporated with a capital stock of \$25,000 by Walter F. Barklage and Louis F. and Joseph Desloge to manufacture and deal in electrical specialties, machinery, etc.

The Bond Automobile Company, St. Louis, has been incorporated with a capital stock of \$10,000 by M. W. Bond, Charles Kist and others and will equip a garage and repair shop.

The Aluminum Ore Company, East St. Louis, Ill., has obtained a permit for an extension to its present plant at Fifty-first street and Missouri avenue to cost \$35,000.

The Superior Folding Box Company, St. Louis, has increased its capital stock from \$5,000 to \$20,000 and will enlarge its manufacturing equipment materially.

Ground has been broken for new yards for the Wabash Railroad at Granite City, Ill., which will include a roundhouse, turntable and shop to cost about \$100,000. The equipment for the shop will be asked for shortly.

The C. W. Daugherty Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of \$200,000 by C. W. and D. A. Daugherty and H. G. Kyle.

The Terminal Railway Company, Kansas City, Mo., will install a new power house at 401 West Twenty-fourth place at a cost of \$175,000.

The Shale Hill Brick & Tile Company, Chillicothe, Mo., has been incorporated with a capital stock of \$200,000 by B. J. Meek, C. F. Adams and William Summerville.

The Mississippi Valley Glass Company, St. Louis, has not completed its definite plans for the fire brick, electric and other plants which it contemplates at Vandalia, Mo.

The city of Elmo, Mo., has voted \$4,000 to be expended under the direction of the mayor for a small electric light plant.

The Marcelline Electric Light & Waterworks, Marcelline, Mo., will expend the \$14,000 recently voted in additional machinery for the existing plant, about 350 horsepower being planned.

George W. Woodford and others, of Carthage, Mo., will develop coal mining property at Alba, Mo., as the Shamrock Mining Company, and will install equipment at once.

The city of Hopkins, Mo., has voted \$12,000 for the construction of a waterworks plant under the direction of the mayor.

The Christian Church Hospital Association at Kansas City, Mo., will erect a \$200,000 hospital with independent heating, lighting and elevator equipment. The association has offices in the Commerce Building, Kansas City.

The curators of the University of Missouri at Columbia, Mo., have contracted for a considerable addition to the engineering building, in which new equipment will be placed when completed.

The Citizens Electric Company, Hot Springs, Ark., whose plant was recently burned, has contracted for reconstruction at a cost of about \$200,000, under the direction of A. Haller, for the Federal Light & Traction Company, 60 Broadway, New York, owner. The generating and other machinery will be steam driven.

A 20-ton ice manufacturing plant is being planned for Arkadelphia, Ark., by Spencer & Sons, of Sallisaw, Okla., who are in the market for the equipment.

A sawmill of considerable capacity will be equipped at Malvern, Ark., by E. M. Hendrix and William Price.

Tennison Bros., of Texarkana, Ark., will open bids October 20 for the construction and equipment of an addition to their present plant for the manufacture of steel ceiling, etc., noted last week. Metal-working machinery is being sought for the plant, which will cost about \$20,000.

R. T. Daniel, of Tulsa, Okla., is reported in the market for steam power equipment of about 300 hp. capacity and electric generating equipment for an office building.

The Southwestern Granite Company, Oklahoma City, Okla., has been incorporated with a capital of \$100,000 by Francis L. McGee, A. A. Gill and Max Linderman and will equip for sawing and otherwise manufacturing stone for building use.

The Grove City Limestone Company, Grove, Okla., has been incorporated with a capital stock of \$20,000 by Harry Hamilton, T. B. DeArmit and others to equip a limestone quarry.

A refrigerating machine of 4 tons daily capacity is to be installed at Oklahoma City, Okla., by the Carroll-Brough-Robinson-Gates Company.

The Dewey Ice Company, Dewey, Okla., has been incorporated with a capital stock of \$10,000 by B. E. and C. A. Baird and E. S. Cuosino and will equip an ice-manufacturing plant.

The N. S. Sherman Machine & Iron Works, Oklahoma City, Okla., has been incorporated with a capital stock of \$100,000 by N. S. Sherman, Sr. and Jr., and W. S. Sherman.

A franchise for an electric light and power plant at Grandfield, Okla., has been granted to Brabham & Edwards, of Frederick, Okla.

The Pleiades Company has plans for the establishment of a cannery with a capacity of 5000 cans daily at Brookhaven, Miss., and is in the market for equipment. W. M. Isbell is president.

The Deeson Oil Mills, Deeson, Miss., recently incorporated with \$75,000 capital stock, will operate for the present with its existing equipment, but will add to the capacity of the plant later, it is announced.

The Union Light Company, Union, Miss., has been incorporated with a capital stock of \$10,000 by J. M. Cole, P. L. Ratcliff and others and will equip a public service plant.

The People's Tie & Timber Company, Louisville, Miss., has been incorporated with a capital stock of \$15,000 by Walter Spira, J. D. McGraw and others and will equip a mill.

The city of Mansfield, La., will issue \$70,000 bonds for the equipment of a city waterworks system.

The Pops Auto & Taxi Service Company, of New Orleans, La., has been incorporated by William P. Johnston, G. R. Guillemet and others and will equip a garage and repair shop.

A sawmill and a stave factory of considerable capacity will be equipped at Ville Platte, La., by E. E. Carrier, A. Lemore and others, of New Orleans, La.

A cannery is to be equipped at Abbeville, La., by John Anderson, who is reported in the market for the equipment.

Birmingham

BIRMINGHAM, ALA., October 4, 1913.

The continued rush of cotton into the market on account of high prices has increased the flow of money in all directions and trade in machinery lines is reflecting the general condition. Large dealers report an increase of business over this time last year, which was good. All cotton industries are calling for machine tools and the general demand from mines for boilers, pumps and engines continues good.

The Dolcito rock quarry of the Birmingham Realty Company, Birmingham, will be enlarged by the installation of a new tippie, etc.

The plant of the Lewis Mfg. Company at North Birmingham was destroyed by fire, except the oil tanks, with a loss estimated at \$25,000, covered by insurance. It is understood that the company, which manufactures by-products from by-product coke ovens, will rebuild.

Wilbur Kelley and associates announce that they are prepared to go ahead with the building of an electric car line, for which they secured a franchise from the city of Birmingham several months ago. Plans include a power house.

The plant of the Newport Turpentine & Rosin Com-

pany at Bay Minette, Ala., will be repaired and improved.

The W. G. Mitchell Lumber Company, Shortland, Ala., will, it is reported, establish a new lumber plant and enlarge the one already in operation.

W. D. McNeill, Ozark, Ala., is reported to be considering the establishment of a \$100,000 spinning mill. The work of organizing the operating company is now being completed.

An ice plant with a capacity of 10 tons will be established at Foley, Ala., by Carl Swanstron and brother.

The Carney Mill & Atmore Electric Company, Atmore, Ala., will, it is reported, establish an ice plant.

O'Brannon & Son, Claxton, Ga., will establish a cold storage plant in connection with an ice factory.

The Griffin Foundry & Mfg. Company, Rome, Ga., whose incorporation was noted in *The Iron Age*, September 25, has taken over the property of the Georgia Foundry & Machine Company, which it will moderately enlarge at the present time. The company advises that it does not expect to make extended improvements until next summer.

The Lakeland Phosphate Company, with a capital stock of \$300,000, will establish a phosphate plant near Lakeland, Fla. C. W. Deen is president, W. D. McRae is secretary and H. E. Mimminger, manager.

The Standton Foundry & Machine Company, Palatka, Fla., is erecting a two-story addition, 30 x 60 ft., to its machine works, which it will equip with new lathes, planers, etc., for working steel, iron, brass and copper.

The Lake Okechobee Fisheries Corporation proposes to establish an ice factory on the lake near Miami, Fla. W. M. Brown and Franklin G. Bush, of Miami, are interested.

Texas

AUSTIN, TEXAS, October 4, 1913.

Torrential rains covering nearly the whole State have fallen almost continuously during the last several days. Great damage has been done unpicked cotton and ungathered corn. These losses are estimated as high as 300,000 bales of cotton, valued at more than \$200,000,000, and 50,000,000 bu. of corn. Floods in the rivers and streams have washed out many railroad and county bridges and have done great damage in other ways. While the rains will be of benefit in the matter of placing a good season in the ground next year they have for the present caused general depression in all lines of business.

The Springfield Rock Company will open quarries near Kingsville. Machinery will be installed. R. J. Kleberg is interested.

Preparations are being made for beginning the construction of the assembling plant of the Ford Motor Company which is to be erected at Houston at a cost of about \$200,000. A. W. Jones is manager of the local branch.

M. Nuckols and associates are arranging to erect a plant at Bishop for the manufacture of silos and also to build a canning factory and a broom factory.

The Dallas Consolidated Electric Street Railway Company, Dallas, Texas, will soon commence the building of shops at the northwest corner of Elm and Peach streets, directly opposite the present barns and shops, to cost \$125,000. The machinery in the present shops and some additional equipment will be used.

The Lane & Bowler Company, Houston, has purchased the foundry and machine shops of the Allen Engineering Company at Memphis, Tenn. The Houston plant of the company will be enlarged. It manufactures irrigation pumps and oil well supplies.

The Texas Refrigerating & Fixture Company will erect a two-story factory building at Dallas. It has purchased a site on Richardson avenue. Lewis Oppenheimer is president.

The Teague Pipe Line & Gas Company has been organized at Waco with a capital stock of \$60,000, and will lay a natural gas pipe line between Mexia and Teague and construct gas distributing systems in the latter place and other towns. J. J. Potts, of Waco, is interested.

The New York Tire Filler Company, Dallas, has been organized with a capital stock of \$20,000. Hugh E. Prather is interested.

The Nell Gill Gin Company will erect a cotton gin at Houston. J. H. Kirby is interested.

The Comanche Brick Company will construct a plant at Comanche for manufacturing brick. It will have a daily capacity of 20,000 bricks. H. Burks is president.

E. F. Ashcroft & Sons are preparing to rebuild their electric light plant at Sulphur Springs at a cost of \$25,000. The new plant will be considerably larger than the present one.

The taxpayers of Floydada have voted a \$20,000 issue of bonds for a waterworks system.

The Josey-Miller Grain Company will erect a grist mill at Beaumont at a cost of about \$50,000. The building will be of steel and reinforced concrete.

Pedda English, San Francisco, Cal., has been granted a franchise by the City Council of Palacios for the construction of a gas plant and distributing system there.

Preparations are being made at Westhoff for the construction of a waterworks system.

A. Snyder and W. L. Hollinsworth, Brownsville, Texas, will construct a large brick manufacturing plant at Tampico, Mexico.

The Pacific Coast

SAN FRANCISCO, CAL., October 2, 1913.

Local machine tool merchants report a steady increase in the number of country buyers in town, and their purchases in the aggregate are fairly large, though running almost entirely to the smaller sized tools for garage and repair work. The increasing use of motor-driven equipment of all kinds in agriculture has greatly increased the amount of repair work, and brought about a marked change in the class of tools required. Some tool business is also coming from mines and manufacturing plants, and while large orders are still scarce the number of inquiries gives considerable encouragement. There is still a tendency among the largest buyers to go East for machinery. In miscellaneous machinery it is possible to discern a slight improvement, but aside from one or two special lines there is no real activity. The recent sale of several municipal and corporation bond issues which have been on the market for some time has caused a little better feeling as to the future, as the lack of money for needed improvements has delayed considerable business which would otherwise have been closed during the summer.

Internal combustion engines of the Diesel type are attracting some attention here at present. The Dow Pump & Diesel Engine Company recently completed a 150-hp. engine of this type for its own plant in Alameda, with excellent results, both in service and fuel cost. Other interests have arranged for the importation of a Swedish line of marine engines using heavy oil, in which considerable business is expected.

The letting of stone contracts for the civic center buildings has been followed by the purchase of considerable quarry machinery. Several important items of the list, however, were taken from the Los Angeles aqueduct. The old aqueduct equipment is gradually being disposed of, but there is still enough to be sold to interfere somewhat with sales of new machinery.

Authority has been received at the Mare Island Navy Yard to spend \$15,000 additional on machine tools for the repair ship Prometheus. Job orders have been issued at the yard for the installation of a salt water flushing system, to cost \$25,000.

Henry Disston & Sons have moved their San Francisco office to 164-168 First street, where they occupy a four-story building, and will put in a complete saw repair and finishing plant.

Preliminary estimates are being made on tools for the San Francisco municipal railway, which is expected to be out with a good sized list in a few weeks.

The Western Pipe & Steel Company, this city, has a contract for the construction of a small smelter at Redding, Cal.

Plans are under consideration for improvements to the Outer Harbor Dock & Wharf Company's property at Los Angeles Harbor, including a number of warehouses, transit sheds and machine shops.

R. M. Hickman, superintendent of the Martin Shock Absorber Company, Los Angeles, has gone East to buy machinery.

The L. F. Moore Truck Company, manufacturer of commercial vehicles, is moving its factory to Torrance, Cal.

Elwin Rowell has purchased a building at Hemet, Cal., and will install a machine shop for heavy work. The Essex Lumber Company, Decoto, Cal., is putting in several new machines and a blower system.

The new compressing plant of the Midway Gas Company near Taft, Cal., will have a well-equipped machine shop. The compressing equipment will include eight large compressors, with four natural gas

engines of 1000 hp. each, two smaller engines and an electric generator.

The Visalia Mfg. Company, Visalia, Cal., is planning to build a new ice plant during the winter.

It is reported that the Union Ice Company will build a large plant at Venice, Cal.

H. J. Alley is preparing to install an ice machine at Escalon, Cal.

A. B. Cravath, formerly of Santa Ana, is putting in a small machine shop at Holtville, Cal.

A. W. Savage, of the Savage Tire Company, announces that a new building will be erected adjoining the present factory at San Diego, Cal., with equipment to double the present output.

Tehama, Cal., has voted to issue \$10,000 bonds for a municipal waterworks system.

Eastern Canada

TORONTO, ONT., October 6, 1913.

Ground has been broken for the new plant of the Canadian Buffalo Forge Company, Ltd., at Berlin, Ont., noted in *The Iron Age* of September 18. The new construction, comprising a building 116 x 210 ft., of brick and steel, with concrete floors, will provide for the company's present requirements and will have provision for the extension of capacity when required. Two high bays fitted with electric traveling cranes will be used for a machine shop and for the erection of steel plate ventilating fans, engines and heaters for factories and public buildings. The roof is to be supported by steel columns with brick curtain walls, and metal sash and rolling steel doors will be used. The equipment of the present plant at Montreal, which has been leased for five years past, will be used as far as possible. In addition the company will be in the market for foundry equipment, machine tools, pipe cutters and tapping machines. The company is closely connected with the Buffalo Forge Company, 490 Broadway, Buffalo, N. Y.

The Ford Motor Company, Detroit, Mich., is having plans prepared for a factory building which it will erect in Toronto, at an estimated cost of \$250,000.

One of the Spring factories belonging to the Spring & Axle Company, Gananoque, Ont., was partially destroyed by fire with a loss estimated at \$40,000, fully covered by insurance. The manager states that the plant will be operating at capacity again within a month.

The new Grand Trunk elevator at Montreal will be in operation by November 15. It is to have a capacity of 1,000,000 bu. The equipment will consist only of carriers for outside elevating and of the machinery necessary for transferring grain from bin to bin.

The Ottawa Car Mfg. Company, Ltd., Ottawa, Ont., has been incorporated with a capital stock of \$3,000,000 by James F. Smellie, T. A. Burgess and others to build cars and locomotives.

The Ogden Electric Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by James E. Maybee and others.

The Modern Marble Works, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by Alfred Roy, J. W. Peachy and others.

The Boot & Shoe Specialties, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by L. A. Handfield, Arthur Handfield and others to manufacture boots and shoes.

The L'Original Stave & Lumber Mfg. Company, Ltd., L'Original, Ont., has been incorporated with a capital stock of \$145,000 by T. Rinfret, Joseph E. Billette and others to manufacture lumber and pulp.

The Union Electro Products Company, Ltd., Windsor, Ont., has been incorporated with a capital stock of \$40,000 by Mae Livens, H. N. A. Livens and others to manufacture electric cooking utensils.

The Bosch Magneto Company, Ltd., Toronto, has been incorporated with a capital stock of \$25,000 by F. D. Norman, W. J. Boland and others to manufacture machinery.

The Economy Fuse & Mfg. Company of Canada, Ltd., Montreal, has been incorporated with a capital stock of \$5,000 by R. W. Hart, Armand Chenier and others to manufacture cartridge fuses.

The Major Automobile, Ltd., Montreal, has been incorporated with a capital stock of \$50,000 by George A. Major, Alexis Frappier and others to manufacture automobiles.

Fels, Ltd., Montreal, has been incorporated with a capital stock of \$30,000 by L. A. David, L. J. M. Dugas and others to manufacture cloth.

The Eagle Shoe Company, Ltd., Montreal, has been incorporated with a capital stock of \$100,000 by S. H. R. Bush, H. L. Butteris and others to manufacture rubber footwear.

The Canadian Shoe Mfg. Company, Ltd., Montreal, has been incorporated with a capital stock of \$500,000 by George V. Cousins, A. H. Elder and others to manufacture leather and rubber goods and footwear.

The Dryden Lumber & Power Company, Dryden, Ont., will install another evaporator in its sulphite plant of a capacity of 20 tons per day. J. B. Beveridge is manager of the company.

It is reported that the Abitibi Pulp & Paper Company, Iroquois Falls, Ont., has decided to erect a 200-ton news print mill next year.

The British Industrial Company, Ottawa, Ont., which is financed by British capital, has decided to erect a large paper mill on the Ashuapouchouan River, along which the Canadian Northern Railway is now extending its Roberval branch.

The Canadian Connecticut Cotton Mills, Ltd., which will manufacture heavy cotton duck used in the making of automobile tires, will locate a factory at Sherbrooke, Que.

The Panther Rubber Mfg. Company, manufacturer of rubber heels and soles, will erect a factory at Sherbrooke, Que.

It is stated that the Riordon Pulp & Paper Company will erect a pulp mill at Haileybury, Ont., having secured an option on 100 acres.

Western Canada

WINNIPEG, October 3, 1913.

Local machinery houses report an improved tone in business. The volume of trade is moderate, but the outlook is brightening. Numerous inquiries regarding machinery for new plants of different kinds are being received, and it is evident that many who had postponed work on new industries and additions to those already established are now looking forward to carrying out their projects in the near future, when it is hoped that financial conditions will have become easier. There is a steady demand for machinery parts, and the amount of business compares favorably with that at the corresponding date of last year.

It is announced that the Richardson Scale Company, Passaic, N. J., will immediately locate a factory at Lethbridge, Alberta.

The Saskatchewan Bridge & Iron Company, which has a capital stock of \$500,000, has started work on the foundation of a new factory at Medicine Hat, Alberta. It will be located on the West Industrial site, and will cost about \$150,000. The first building will be 130 x 300 ft. The company will make structural steel for general bridge and construction work. George Harrison is manager.

A. Doucette has been awarded the contract for the construction of a powder factory at New Denver, B. C., for the Steelite Explosives Company, of Nelson, B. C. The building will be completed in about a month.

Estevan, Sask., has voted to make extensions to the municipal power plant.

The North American Development & Construction Company, Ltd., Winnipeg, Man., has been incorporated with a capital stock of \$100,000 by Standish R. G. Vereker, of Hamsterley, England, W. J. W. Bullock and others to construct and equip hydraulic plants and hydroelectric plants.

It is reported that the Port Huron Mfg. Company, Port Huron, Mich., will in the near future erect a plant at Portage la Prairie, Man. The company has already arranged for distributing warehouses there.

The Grand Trunk Pacific Railway is preparing plans for enlarging the shops at Biggar, Sask.

Government Purchases

WASHINGTON, D. C., October 2, 1913.

Bids will be received at the United States Engineer office, 815 Witherspoon Bldg., Philadelphia, Pa., until October 20, for one Scotch marine type boiler for the United States steamer Vidette and for two boilers of the same type for the United States dredge Cataract. Address George A. Zinn, colonel, engineers.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until October 21, under Schedule 5892, for furnishing and erecting two 10-ton, 3-motor electric traveling cranes for Philadelphia.

Bids will be received at the office of the quartermaster, Coast Defense of San Francisco, Fort Winfield Scott, Cal., until October 14, for the installation of an oil burning apparatus for the artillery steamer Captain Gregory Barrett. Address John T. Geary,

captain coast artillery corps, coast defense quartermaster.

Bids will be received at the office of the United States Reclamation Service, Elephant Butte, N. M., until November 19, for furnishing four 60-in. balanced valves and accessories, under specifications No. 242, and for four 47 x 90 in. service gates and accessories, under specifications No. 243, for the Elephant Butte Dam, Rio Grande project, New Mexico-Texas.

Bids were received at the Bureau of Supply and Accounts, Navy Department, Washington, September 30, for furnishing supplies for the navy yards as follows:

Schedule 5801—Construction and Repair.

Class 1, Mare Island—One automatic steam towing machine—American Engineering Company, \$7500.

Class 1, Alternate—One automatic steam towing machine, f. o. b. works—American Engineering Company, \$6500.

Schedule 5813—Ordnance.

Class 11, Mare Island—One steam driven, 3-stage, high-pressure air compressor—Ingersoll-Rand Company, \$1800.

Schedule 5814—Steam Engineering.

Class 21, Mare Island—Welding and cutting outfit—Autogenous Welding Device Company, \$455; Davis Bournonville Company, \$1071; Alexander Millburn Company, \$1159.50.

Class 21, Alternate; welding and cutting outfit, f. o. b. works—Alexander Millburn Company, \$1109.50; Macleod Company, \$1156; Oxweld Acetylene Company, \$1134.50.

Schedule 5829, Ordnance.

Class 41, Washington—One vertical milling machine—Brown & Sharpe Mfg. Company, \$2141.20 and \$2529.70; Ingersoll Milling Machine Company, \$2712.32; Kemp Machinery Company, \$1993; Manning, Maxwell & Moore, \$2300; Niles-Bement-Pond Company, \$2300.

The proposed New York City "civic center" will necessitate the removal of the main office and warehouses of the U. T. Hungerford Brass & Copper Company, from the quarters so long occupied, corner Pearl and Park streets, as it is expected the property will be purchased by the city. It is learned that the Hungerford Company has purchased a large parcel of ground fronting on Lafayette street, opposite the Criminal Court House and running through from White to Franklin street, on which it is erecting a 16-story fireproof office and warehouse building. Contract has been let to the Geo. A. Fuller Company, which has commenced work and expects to have the building ready for occupancy next July. The large stock of brass and copper material carried by the Hungerford Company is exceptionally heavy. The building is therefore being strongly constructed and will be equipped with all modern appliances to facilitate handling.

Approximately one in every 400 inhabitants of the United States is employed by the postal service. Tabulations by the Post Office Department show that on June 30 last there were 58,021 postmasters, 115,415 assistant postmasters and post office clerks, 1454 watchmen, messengers and laborers, and 30,920 city letter carriers. Other employees—railroad mail clerks, rural carriers and department employees—make the total number about a quarter of a million. This makes the Post Office Department the largest business department of the Government.

The York Mfg. Company, ice making and refrigerating machinery, York, Pa., has purchased the business of the Hench & Dromgold Company, agricultural implements, and it will probably be continued under the old name. The buildings and ground, however, will be occupied by the York Mfg. Company as an annex, but not until the other business has been housed in a plant much better adapted to the purpose than the one it now occupies.

The Oil Furnace & Engineering Company, 60 Liberty street, New York, having such a large demand for its natural draft oil-burning furnaces, has decided to build only the larger sizes of melting and heating furnaces. This principle of burning oil without an atomizing medium is stated to be meeting with much favor from nickel, copper and malleable-iron melters as also those using heating furnaces in their operations.

An unprecedented demand is reported in some parts of Russia for agricultural machinery and implements, being almost three times as great as in preceding years. Many firms have sold out all their stocks and dealers have received prices for agricultural machinery and implements 35 per cent. above normal rates. The harvest has been good and the cost of labor is high.

